An Evaluation of

"EPA Comments on North Dakota Department of Health's Proposed Determination Regarding the Adequacy of the SIP to Protect PSD Increment for Sulfur Dioxide" dated 24 May 2002

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– FINAL –

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Purpose

On several occasions spanning the late 1970s, 1980s and early 1990s, the North Dakota Department of Health conducted air quality modeling assessments that showed potential violations of the federal and state Prevention of Significant Deterioration (PSD) 24-hour increment for sulfur dioxide at state PSD Class I areas. On all of these occasions, Federal Land Managers for the Class I areas certified that anticipated emissions from major sources would not have an adverse impact on Air Quality Related Values (AQRVs), including visibility impairment, in the Class I areas.

The PSD sulfur dioxide increments are numeric thresholds of allowable deterioration of ambient sulfur dioxide concentrations subsequent to the PSD minor source baseline date, which for western North Dakota is 19 December 1977. For the 24-hour averaging period, the PSD Class I area increment is 5 ug/m3, not to be exceeded more than once per year.

The Department's most recent modeling assessment was conducted in 1999. The Department prepared a draft report describing air quality modeling to determine whether a proposed major modification to the Milton R. Young Station near Center, North Dakota, would comply with the PSD Class I area increments. The modeling, which used permit allowed three-hour emission rates for sulfur dioxide rather than actual emission rates, also showed exceedances of the PSD Class I 24-hour increment for sulfur dioxide.

By late 2000, the U.S. Environmental Protection Agency (EPA) insisted that the Department revise its State Implementation Plan to correct the PSD increment exceedances. In a 13 March 2001 letter, the Department indicated it would proceed to determine whether exceedances of the PSD Class I increment for sulfur dioxide would occur when modeling with a revised protocol that included adjusted emission rates. Later that same month (28 March 2001), EPA wrote: "We acknowledge that the State needs to refine the modeling analysis to better determine appropriate control strategy(ies) to address the violations, ..."

In May 2002, the Department conducted a fact-finding hearing pertaining to draft legal analyses of issues relating to the federal Clean Air Act, to EPA's PSD rules, and to its draft reports that describe a new PSD baseline emissions assessment and a new modeling assessment of PSD increment consumption. The Department completed the modeling and conducted the hearing as a periodic review pursuant to 40 CFR 51.166. Apparently, no state has ever conducted a periodic review of PSD increment consumption assessment outside of New Source Review (NSR).

The Department's (hereafter State's or State) proposed PSD baseline sulfur dioxide emissions and air-quality computer modeling protocol are, respectively, exhibits 4 and 6 in the docket of exhibits for the State's hearing conducted 6 May 2002. EPA has described its concerns regarding the State's application of modeling in a document titled "EPA Comments on North Dakota Department of Health's Proposed Determination Regarding the Adequacy of the SIP to

Protect PSD Increments for Sulfur Dioxide." EPA's document, which is dated 24 May 2002, is exhibit 57. EPA also provided testimony during the State's hearing. [1] (Exhibit 35 as well as pages 40 through 126 in the hearing transcript, which is exhibit 48.)

The State has reviewed EPA's exhibit 57. This exhibit, as well as exhibit 8, reveal EPA's discretionary preferences in application of its guidance as well as the guidance of other federal agencies. Many of the State's comments are indexed to numbers assigned to each paragraph in exhibit 57. A copy of exhibit 57 with inserted paragraph indexing numbers in left margins is attached.

The State's review of EPA's exhibit 57 follows. The review does not address parts II, VII and VIII of this exhibit. The review, which addresses parts I, III, IV, V and VI, reflects the State's legal research, but does not describe the State's legal conclusions. The legal aspects of PSD issues have been addressed by the State in other documents, such as exhibits 2 and 32 in the docket of exhibits for the State's hearing.

The purpose of this document is to provide information, to clarify differences between the State's computer modeling protocol and EPA's preferred modeling protocol, and to respond to apparent EPA misunderstanding of aspects of the State's protocol.

This document does not provide a new State assessment of the deterioration of ambient sulfur dioxide concentrations subsequent to the PSD minor source baseline date; such deterioration is commonly stated as consumption of PSD Class I area sulfur dioxide increments.

Part I: OVERVIEW

The crux of EPA's concerns apparently are reflected in paragraph 8 on page 4 of exhibit 57. Specifically: "On April 2, 2001, we received the modeling protocol from the State. The protocol was not acceptable to EPA because the State did not demonstrate that the protocol would be at least as protective of air quality as a protocol developed pursuant to longstanding EPA regulation and guidance for determining [PSD] increment consumption." [2] (a citation omitted and acronym inserted) Continuing in paragraph 9 on page 5: "When we could not

[1] The record of the hearing remained open for comments through 24 May 2002. "Findings and Conclusions" of the State Health Officer, North Dakota Department of Health, were issued 8 August 2002.

[2] In a 25 June 2001 letter, EPA responded with comments. (Exhibit 17.) The State's protocol as in exhibit 8 addressed those comments; for example, the State used five years of weather data rather than one year as proposed in its 2 April 2001 protocol. Several other changes to the State's protocol subsequently occurred as it closely reviewed aspects of the protocol, including "actual emissions", "baseline concentration," and emissions of minor sources.

reach agreement with the State on the modeling approach, EPA performed its own modeling." EPA's modeling is exhibit 8 in the docket of exhibits for the State's hearing. [3]

The State has known that its application of computer modeling would challenge several of EPA's historical precepts that form the basis for its preferred modeling protocol. The State believes that:

a. Law and rule create the foundation for application of modeling, such as the definitions for "baseline concentration" and "actual emissions";

b. When law and rule are not prescriptive in application of modeling to assess attainment of PSD Class I increments, it has used its discretion in ways that reflect known federal agency guidance and that are reasonable, practical and defensible applications of science and engineering;

c. Its approach provides information as to whether current ambient sulfur dioxide concentrations in PSD Class I areas are greater than or less than respective baseline concentrations for those areas;

d. Its modeling protocol facilitates calculation of best estimates of deterioration or improvement in ambient sulfur dioxide concentrations within PSD Class I areas (a.k.a. tracking PSD increment consumption); and

e. Its modeling protocol provides Department of Interior's (DOI) federal land managers with the information they need to assess air quality impacts on AQRVs in PSD Class I areas.

In summary, the State believes that its approach is consistent with the federal Clean Air Act, State and EPA rule, EPA preambles associated with published PSD rules and salient aspects of guidance offered by EPA and the federal agencies that are responsible for managing natural resources of PSD Class I areas.

The State's computer modeling protocol (as in exhibit 6) deviates from EPA's preferred modeling approach (as in exhibit 8) in seven fundamental aspects.

a. No prior modeling assessment of consumption of PSD Class I increments for Class I areas in the state included comprehensive emissions inventories. EPA did not include the oil and gas production wells and some major sources. The

[3] EPA's report was released on 5 March 2002 for public comment. The comment period closed 29 April 2002. The State provided comments on EPA's report in a letter dated 29 April 2002. (Exhibit 27.)

State developed comprehensive inventories of emitted sulfur dioxide for both PSD baseline and current period, which included oil and gas production wells.

b. EPA rigidly set normal operation as occurring during the two years preceding the sulfur dioxide minor-source baseline date. Consistent with discretion described by EPA regarding application of rule for calculating "actual emissions" so as to determine "baseline concentration," the State evaluated the operation of most major sources and selected a two-year period after the PSD minor-source baseline date as more representative of some sources' normal operations than the two-year period preceding the baseline date.

c. EPA did not calculate sulfur dioxide emissions per rule defined "actual emissions," but instead determined 90th percentile rates. Consistent with rule, the State determined sulfur dioxide "actual emissions" for each major source as the rate expressed as an annual average during that source's normal operation, such as pounds per operating hour or grams per operating second. This approach was used for each major source operating around PSD baseline and for each source operating during the current period.

At several places within exhibit 57, such as paragraph 14 on page 7, EPA notes that the State can "... demonstrate that the State's techniques are more appropriate ..." than its modeling guidelines and that EPA has "... the authority to approve another technique if it can be demonstrated to be more appropriate than those recommended in the Modeling Guidelines." The State presumes that the reference to "Modeling Guidelines" includes the 1980 and 1990 New Source Review workshop manuals, as well as EPA's Guideline on Air Quality Models.

d. EPA did not calculate a "baseline concentration" for each Class I area. Consistent with law and rule, the State determined a "baseline concentration" for the 3-hour and the 24-hour averaging period for each PSD Class I area by modeling an inventory of sulfur dioxide emitted by baseline sources.

e. EPA's approach does not provide total cumulative concentrations due to current-period sulfur dioxide emissions. Consistent with data needed by Federal Land Managers, the State determined current-period concentrations for all 3-hour and the 24-hour averaging periods for each PSD Class I area by modeling a current-period inventory of emitted sulfur dioxide.

f. EPA's approach does not provide information as to whether current-period concentrations have deteriorated or improved relative to the "baseline concentration". In the State's modeling approach, the second-highest 24-hour

sulfur dioxide concentration occurring within a Class I area during the PSD baseline (the "baseline concentration") is subtracted from all (e.g., 365) 24-hour sulfur dioxide concentrations occurring within that area during the current period (present time line). A difference greater than the PSD Class I area 24-hour increment of 5 ug/m3 is an exceedance (or violation).

g. EPA predicated PSD increment consumption tracking by receptor without regard to geometric scales for AQRVs. Consistent with geometric scales of sulfur dioxide impact via deposition and visual impairment, the State predicated PSD Class I increment consumption tracking – the deterioration or improvement in ambient sulfur dioxide concentrations – upon a statistical average (a.k.a. mean) of concentrations occurring at model receptors within a PSD Class I area.

The observations that follow elaborate on these and other aspects of the State and EPA modeling protocols and are extracted from exhibits 6, 8 and 57 as well as several other exhibits in the docket for the State's hearing. A list of testimony and exhibits received during the State's hearing and comment period is attached.

Part II: GENERAL OBSERVATIONS

Regarding – EPA's primary guidance documents

1. This evaluation of aspects of application of air quality modeling protocols is based in part on EPA's discussion in preambles associated with PSD rules published in Federal Registers (FRs) and on three EPA guidance documents. The guidance documents are:

   a. "Prevention of Significant Deterioration – Workshop Manual" dated October 1980. On page ii, EPA states: "Because this manual tends to condense the basic regulations, it may not precisely reflect the regulations and preamble thereto announced in the Federal Register on August 7, 1980 (see CFR 52676). Should there be any apparent inconsistency between this manual and the regulations published on August 7 (including any policy decisions made pursuant to those regulations), such regulations and policy decisions shall govern."

   b. "New Source Review Workshop Manual – Prevention of Significant Deterioration and Nonattainment Area Permitting." DRAFT, October 1990. In the Preface, EPA states: "This document was developed for use in conjunction with new source review workshops and training, and to guide permitting officials in the implementation of the new source review (NSR) program. It is not intended to be an official statement of policy and standards and does not establish binding regulatory requirements; such requirements are contained in regulations and approved state implementation plans."

c. "Appendix W to [40 FR] Part 51 – Guideline on Air Quality Models." In section 1.a, EPA states: "The guide is not intended to be a compendium of modeling techniques. Rather, it should serve as a basis by which air quality managers, supported by sound scientific judgement, have a common measure of acceptable technical analysis."

Regarding – discretion in modeling

2. In 1980, EPA stated: "Before a PSD permit can be granted, the applicant must demonstrate that neither the National Ambient Air Quality Standard (NAAQS) nor an allowable PSD increment will be violated as a result of the emissions ... subject to PSD requirements." (1980 Prevention of Significant Deterioration Workshop Manual, page I-C-1.) In 1990, EPA similarly stated: "The main purpose of the air quality analysis is to demonstrate that ... emissions ... will not cause or contribute to a violation of any applicable NAAQS or PSD increment." (Draft 1990 New Source Review Workshop Manual, page C.1, emphasis added.)

This document presents several questions and suggests several data and air quality model performance analyses related to apparent suppositions about predicted air quality concentrations (such as gradients across PSD Class I areas), the baseline concentration, tracking air quality deterioration and model performance.

3. EPA established the pathway of discretion through interpretive rule preambles for rules and through guidance. It refers to aspects of its modeling protocol as in exhibit 8 as conservative. (Paragraph 9 on page 5 of exhibit 57.) It characterizes exhibit 8 as follows: "This study represents what EPA believes to be a reasonable, but not necessarily the most conservative, methodology to assess the status of Class I increment consumption in North Dakota ... We believe this approach also best meets the intent of the increment modeling – to characterize the potential for increment violations under realistic emissions and meteorology conditions." (Page 1 of exhibit 8, emphasis added.)

4. In contrast to paragraphs 2 and 3 above, a risk tolerance for a violation of a PSD increment is inherent when models are used to determine "best estimates" of sulfur dioxide concentrations. Due to lack of techniques to quantify accuracy and uncertainty of air quality models' estimated (a.k.a. predicted) concentrations for use in decision-making by air quality program administrators, EPA recommends: "For the present, continued use of the 'best estimate' is acceptable and is consistent with Clean Air Act requirements." (40 FR 51, Appendix W, section 10.2.)

Regarding – existing ambient sulfur dioxide

5. Demonstrations of attainment of NAAQS or tracking of consumption of PSD increments parallel exposure risk assessments. Specifically, such demonstrations include three elements: characterization of sulfur dioxide emissions, the atmospheric transport and fate of those emissions, and characterization of PSD Class I area receptor exposures. The three elements are not mutually exclusive. Together, these elements comprise an air quality modeling protocol.

6. Many sulfur dioxide emitting sources are located in central and western North Dakota, and some sources are located in eastern Montana and southern Saskatchewan. A major source of sulfur dioxide emits, or has the potential to emit, one hundred tons or more per year. (NDAC 33-15-15-01.1.y.)

    a. In North Dakota, major sources constructed and operating prior to 19 December 1977 (the PSD minor-source baseline date for sulfur dioxide) were coal-fired electric steam-generating plants, natural gas processing plants, oil refineries and a charcoal briquette plant. Some major sources were retired after the minor source baseline date. Other major sources were constructed after 6 January 1975 (the PSD trigger date) such as coal-fired electric steam-generating plants, natural gas processing plants and a coal-fueled synthetic natural gas plant.

    b. In North Dakota, numerous minor sources – oil and gas production wells – were placed into operation prior to the PSD minor source baseline date. Subsequently, many were shut down, and many have been constructed and placed into operation.

    c. The sulfur dioxide emissions of the oil and gas production wells dominated the ambient sulfur dioxide in the state's PSD Class I areas during the 1980s. [4]

7. Across North Dakota in general, and in the state's PSD Class I areas in particular, ambient concentrations of sulfur dioxide are a fraction of the NAAQS. (Exhibit 34 in the hearing docket.) The 24-hour sulfur dioxide NAAQS is 365 ug/m3, not to be exceeded more than once per calender year. Ambient concentrations of sulfur dioxide are not known at or preceding the PSD minor-source baseline date, which is 19 December 1977.

    a. Modeling data suggest that the second-highest 24-hour sulfur dioxide concentration at PSD baseline in the South Unit of Theodore Roosevelt National

[4] The time lines for start up of major sources are provided in table 4 on pages 29 and 30 in exhibit 11.

Park (TRNP) may have ranged between 7.0 and 9.5 ug/m3 and in the North Unit between 17.2 and 21.5 ug/m3, plus a background concentration. (Exhibit 52.)

b. Deterioration of ambient 24-hour sulfur dioxide concentrations in a PSD Class I area exceeding 5 ug/m3 on two or more days per calender year – after the PSD minor-source baseline date – potentially is a violation of the federal CAA.

Regarding – modeling protocol change

8. The State's PSD air-quality modeling protocol has evolved since 1977, when PSD was amended into the federal Clean Air Act (CAA). The protocol used by the State in exhibit 6 contains several adjustments from prior State PSD-regulatory applications of models. Representations of source sulfur dioxide emissions have changed as shown in figure 2 attached – increment-expanding and increment-affecting emissions were first included in 1999. The models of choice have changed as shown in tables 6 and 8 in the State's exhibit 11 – the State began using a mesoscale model in 1981. Only one year of weather data was used during the late 1970s and early 1980s – thereafter, the weather data was expanded to five years. And, model receptors were added at places of higher terrain on perimeters of the state's PSD Class I areas.

9. Since early 2000, EPA has alleged deficiencies in the State's modeling protocol for assessment of PSD Class I increment consumption. (For example, exhibit 17.) The current choice of model, which is Calpuff, is not central to EPA's concerns. (Exhibit 57, paragraph 4 on page 3 and paragraph 71 on page 30.) Furthermore, EPA prefers the use of the five years of weather data as applied by the State. (For example, paragraph 67 on page 28.) Thus, EPA concerns apparently relate to the State's representations of sulfur dioxide emissions (as model input) and the State's representations and interpretation of model predicted ambient sulfur dioxide concentrations (from model output).

Regarding – the Calpuff model

10. The Calpuff model is a time-variable, Lagrangian model that is accepted for predicting ambient sulfur dioxide concentrations at distances from sources of 200 kilometers or more. (Exhibit 29.) The model requires temporal (time variable) and spatial (location variable) weather data. It can accept temporal emission rates (mass per unit time) of sulfur dioxide from multiple sources at disperse locations. (Exhibit 7.)

    a. Emissions rates – such as the permit maximum short-term allowed rate, the 90^{th} percentile of sequential 24-hour averaged Continuous Emission Monitoring (CEM) data and the annual hourly average of CEM data during operating hours

– are not time-sequential inputs to the model, but rather constants that are applied 24/7 in modeling. [5]

b. The actual sulfur dioxide emitted by multiple sources during a sequential 3-hour, or 24-hour, time block likely does not concurrently arrive at PSD Class I areas during one of subsequent sequential time blocks. Emitted sulfur dioxide is time integrated as well as spatially dispersed, because sources are not co-located and winds vary temporally and spatially.

11. The Calpuff model is capable of predicting ambient sulfur dioxide concentrations at a place due to emissions of multiple sources that reasonably correlate with measured – but unpaired in time – ambient concentrations at that place. (Appendix B of exhibit 6.) As shown by the State's Calpuff performance assessment, the highest model-predicted short-term concentration occurring during the year compares favorably (within a factor of two) with the highest measured concentration occurring during that year; similarly the second highest, third highest, etc. (Id., figure 2 on page 64.)

a. EPA acknowledged the State's performance test. (Paragraph 72 on page 30, and pages 11-16 of exhibit 8.) And, it also noted that performance results are unpaired in time. (Page 11 of exhibit 8.)

b. The Calpuff model is not capable of predicting ambient sulfur dioxide concentrations at the model's receptors that are reasonably correlated when paired in time with measured (a.k.a. monitored) ambient concentrations, in spite of the time-dependent emissions data and weather data used as input to the model. (Appendix B of exhibit 6 and pages 348 through 350 of exhibit 48.)

Part III: MODELING PROTOCOL CONSTRUCTION

Regarding – "baseline concentration"

12. The State's rules at North Dakota Administrative Code (NDAC) 33-15-15-01.2.b and 01.4.e state that emission increases or reductions cannot contribute to air pollution in violation of any applicable, allowable increase over the "baseline concentration" in any area. "Baseline concentration" is defined at NDAC 33-15-15-01.1.d. (Variance provisions for exceedances of increments are at NDAC 33-15-15-01.4.j.(4).)

[5] When all other aspects of a modeling protocol remain the same, then the highest or second-highest short-term predicted ambient concentrations occur during the same weather events irrespective of time constant emission rates input to the model.

Illustration of salient computer-modeling protocol issues discussed in Parts II, III and IV of this document.

Apples to apples calculation of air quality deterioration: for example, when Rc minus Rb or Gc minus Gb is greater than 5 [6], an exceedance of the 24-hour increment occurs.

Current period emission rates and current period concentrations (Rc or Gc).

Necessary for calculating cumulative effects of emissions from all sources on ambient concentrations

	Receptor grid	
	By Receptor	Grid Ave.
90th percentile rate (all hours)	EPA [3]	
annual average rate [5] (op. hours)	Rc	Gc

Baseline period emission rates and baseline concentration (Rb or GB).

	Receptor grid	
	Peak [1]	Grid Ave. [2]
90th percentile rate [4] (all hours)	EPA [3]	
annual average rate [5] (op. hours)	Rb	Gb

[1] Highest second-highest time-blocked average among all receptors on the grid.
[2] Second highest time-blocked grid average.
[3] EPA did not model current period or baseline period major-source emission rates; instead, it modeled changes in rates from baseline to current period. And, it did not model minor source emissions.
[4] Actual time dependent emission rate data are not available during the baseline period.
[5] Required per rule definition of "actual emissions."
[6] The PSD 24-hour increment for sulfur dioxide is 5 ug/m3.

a. EPA's 40 FR 51 Appendix W (Guideline on Air Quality Models) was first published in 1978. Exhibit 14, which was the most recent version of this guideline at the time of the State's May-2002 hearing, does not mention the CAA or rule requirements to determine the PSD "baseline concentration". In fact, a word search revealed that the term "baseline concentration" does not occur in this guideline.

b. EPA provides the rule definition for "baseline concentration". (Paragraph 42 on page 20 of exhibit 57.) It also states that "PSD regulations also require that baseline concentration be determined by establishing the ambient concentration level which exists in the baseline area at the time of the minor source baseline date." (Paragraph 43 on page 20 [emphasis removed] of exhibit 57; see also paragraph 31 on page 15 and paragraphs 35 and 36 on pages 16 and 17.) EPA also states: "... the baseline concentration is the reference point for determining air quality deterioration in an area." (Draft 1990 New Source Review Workshop Manual, page C.6.)

c. The State conducted ambient monitoring of sulfur dioxide prior to the PSD minor source baseline date, which is 19 December 1977. (Exhibits 20 and 21.) However, no monitors were located within PSD Class I areas at that time. Later, EPA determined that the monitoring method and data were unreliable (45 FR No. 154, page 52,724); thus, there are no ambient sulfur dioxide data until 1979-1980, when a new method was deployed.

d. Regarding existing ambient concentrations determined from preconstruction monitoring data, EPA states: "Having collected and screened the data, the [permit] applicant should integrate the results of the monitoring in the air quality analysis. The amount of data and the manner of presentation in the application depend on the requirements of the permit-granting authority. At a minimum, the data should be presented in a summary format showing highest and highest, second-highest concentrations for pollutants with short-term standards ... The concentrations effectively describe the existing ambient concentration within the impact area attributable to actual emissions from existing sources." [6] (Prevention of Significant Deterioration – Workshop Manual. EPA, OAQPS, RTP. October 1980. Pages I-C-22 and 23.)

e. However, EPA apparently concluded that the short-term highest or highest second-highest concentration in a PSD Class I or Class II area – per paragraphs b and d above – is not needed when calculating future deterioration or

[6] The baseline precepts in this paragraph are not included in the subsequent draft manual that is titled "New Source Review Workshop Manual" dated October 1990. The State's rules at NDAC 33-15-15-01.g.(1).(a, c & d) describe preconstruction air quality monitoring.

improvement in ambient sulfur dioxide. In 1980, EPA states – without explanation: "[s]ince ... [PSD air quality assessments] can be made without knowing the baseline concentration, the need to determine baseline concentration is often not very important." [7] (Id., page I-C-4, words inserted.) In 1990, EPA states – also without explanation: "... in order to determine the amount of PSD increment consumed (or the amount of available increment), no determination of the baseline concentration needs to be made. Instead, increment consumption calculations must reflect only the ambient pollutant change attributable to increment-affecting emissions." (Draft 1990 New Source Review Workshop Manual, page C.10.)

Regarding – modeling of emissions

13. EPA's preferred protocol does not predict ambient sulfur dioxide concentrations in PSD Class I areas. Instead, EPA determines changes in ambient concentrations by modeling the changes in major-source emission rates that occurred after the PSD minor-source baseline date. (Exhibit 48, page 49, and exhibit 8, page 17.) EPA did not include minor sources of sulfur dioxide. (Exhibit 48, page 46.) In order to determine sources' emission rate decreases or increases, EPA has to first establish the emission rate of each source for sulfur dioxide (1) around PSD baseline and (2) preceding the date of concern. [8] (Table 3-4 in exhibit 8.) The modeling of the emission rate decreases or increases yields one set of data that are changes in ambient sulfur dioxide concentrations. [9] EPA's protocol requires these assumptions:

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[7] "Baseline concentration is the adjusted ambient concentration ... The baseline concentration also includes projected emissions of major sources commencing construction before January 6, 1975 but not in operation as of the [PSD minor source] baseline date. Conversely, increment consumption is, in general, that portion of ambient air concentration in an area which results from: 1. Emission[s] ... at major stationary sources resulting from construction that began after January 6, 1975, and 2. Emission increases and decreases at all [other] stationary sources occurring after the [PSD minor source] baseline date. In general, increment consumption and expansion are based on actual emissions. However, if little or no operating are available, as in the case of permitted emissions units not in operation at the time of increment analysis, the allowable emission rate must be used." (Prevention of Significant Deterioration – Workshop Manual. EPA, OAQPS, RTP. October 1980. Page I-C-3. Words inserted.)

[8] Based upon the data – for major sources – shown in table 3-4 of exhibit 8, EPA's calculated baseline 24-hour emission rates totaled 21,072 pounds per hour, current-period 24-hour emission rates totaled 52,525 pounds per hour and increment-affecting 24-hour emission rates totaled 31,453 pounds per hour. (The State could not reproduce EPA's current-period 24-hour emission rates in this table.) Based upon the data in table 3-6, the increment expanding emission rates of PSD baseline sources that ceased operation after the PSD minor source baseline date totaled 2,576 pounds per hour (253 grams per second). However, the numbers for the retired sources are not 90th percentile 24-hour emission rates, but are annual averaged rates.

[9] Section 1.a in EPA's Guideline on Air Quality Models states: "The Guideline recommends air quality modeling techniques that should be applied to State Implementation Plan (SIP) revisions for

a. The model's predicted ambient concentrations over Class I areas are linear with respect to the sulfur dioxide emission rates of the sources.

b. Its modeling produces the same result in predicted changes in sequential time-blocked ambient sulfur dioxide concentrations at each of the model's receptors in PSD Class I areas as would calculating changes using the results of modeling of each source emission inventory. And, the background concentration due to distant and other sources has not changed since PSD baseline.

c. The stack characteristics, such as temperature and flue gas speed, of major sources at PSD baseline were the same as stack features during current-period emissions.

d. The modeling of the increment expanding emission rate of a retired baseline source (pages 30 and 31 of exhibit 8) reduces sequential time-blocked sulfur dioxide concentrations at PSD Class I area receptors that mirror concentrations due to an increment consuming emission rate of identical magnitude. (Increment expanding emissions are negative numbers per footnote number 1 for table 3-5 of exhibit 8. A similar footnote was not included with table 3-6.)

Apparently, assumptions a and b above applied at the time (1980 and 1990) of EPA guidance when short-range (less than 50 kilometers), steady-state models were used. EPA did not demonstrate that the two assumptions hold true using its Calpuff protocol. (Exhibit 8.) The State's protocol avoids the presumption that the two assumptions hold true for mesoscale air quality modeling analyses, and its protocol provides the flexibility to use source stack characteristics at PSD baseline when such information is available.

EPA provides an illustration of its PSD increment methodology as figure 4 of exhibit 57. Apparently, the illustration represents the results of EPA's modeling protocol at a receptor in a state PSD Class I area. The Y-axis, labeled "Increment Consumption (ug/m3)", has a scale from 0 to 15. The illustration only displays amounts of daily deterioration in sulfur dioxide concentrations since all data are 0 or larger. Net improvements in sulfur dioxide concentrations due to inclusion of the six increment-expanding sources would be represented as negative deterioration; and, the Y-axis would have a scale ranging from a value less than 0 to 15. The six sources are not co-located with increment consuming sources. *A question is: Does EPA's*

existing sources and to new source reviews, including prevention of significant deterioration (PSD)." [citations omitted] Paragraph 9.1.2 (k) indicates that SIP control strategies and PSD and NAAQS compliance demonstrations should follow tables 9-1 and 9-2, respectively. Neither table describes use of changes in emission rates in modeling.

figure 4 demonstrate that the changes (deterioration) in sulfur dioxide concentrations due to increment consuming emissions (page 27 of exhibit 8) offset changes (improvement) in sulfur dioxide concentrations due to increment expanding emissions in every instance (each 24-hour averaging period)?

14. The State's protocol for projecting ambient sulfur dioxide concentrations in PSD Class I areas applies the Calpuff model to the sulfur dioxide emitted from minor and major sources (1) around the PSD minor-source baseline date and (2) preceding the date of concern (a.k.a. current period). Thus, the State determines inventories of source emissions of sulfur dioxide first around PSD baseline and second preceding the date of concern. (All other inputs to the model are the same for projecting the ambient concentrations in PSD Class I areas.) Upon applying the model to the two emissions inventories, the State consequently has two sets of model output data – one representing the ambient concentrations for sulfur dioxide at the PSD baseline and the other representing concentrations for the current period. The two sets of concentration data are used to determine the improvement or deterioration in ambient sulfur dioxide over PSD Class I areas.

The State's protocol is consistent with EPA's 1980 Prevention of Significant Deterioration – Workshop Manual. When performing a PSD air quality impact analysis, EPA indicated that the permit applicant should, among other tasks, "compile an emissions inventory" and "determine existing air quality." (Page I-C-25.)

a. The State's two source inventories encompass the three inventories described by EPA in 1980. [10] The first is an inventory of existing sources contributing to existing ambient air quality, the second is an inventory of sources permitted to operate but not yet operational, and the third is an inventory of emissions that affect increment. [11] (Id, pages I-C-27 and 28.)

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[10] The two data sets reflect all changes in emitted sulfur dioxide after PSD baseline. EPA states: "Increment consumption calculations must reflect only the ambient pollutant concentration changes attributable to increment-affecting emissions. [51]" (Exhibit 57, paragraph 34.) EPA's footnote 51 refers to its 1990 Draft New Source Review Manual. In paragraph 38, EPA explains why its approach is preferable over the alternative of modeling the two source emissions inventories when it states "... there is insufficient historical information on many of the sources in the State's inventory to reliably determine baseline concentrations." Nevertheless, EPA assumes source characteristics (stack flue gas temperature, etc.) were the same at PSD baseline as during the current period. And, it calculates PSD baseline emission rates, which are required to calculate changes in rates. (Exhibit 8, table 3-4.)

[11] EPA subsequently abandons the first two of these emissions inventories as well as determining baseline concentration. (1990 draft New Source Review Workshop Manual, page C.10.)

b. The State's modeling of the two emissions inventories is performed with the same meteorological data driver (e.g., Calmet) and the same model receptor network. Thus, the concentration data in the two data sets are temporally and spatially consistent.

c. Changes in major-source sulfur dioxide emissions after the PSD baseline – historically referred to as increment-affecting or increment-expanding – can be calculated; but, such changes are not input for the model.

d. The two data sets can be used to calculate the ambient pollutant change attributable to increment-affecting and increment-expanding emissions. Specifically, the two data sets can be used (i) to mimic EPA's protocol – by calculating the change in ambient sulfur dioxide concentration for each sequential time block (reflecting respective short-term increments) for each model receptor – or (ii) to determine the deterioration, or improvement, in ambient sulfur dioxide concentrations from a "baseline concentration" concurrent with the PSD minor source baseline date as described elsewhere in this document.

Regarding – emissions inventories and "actual emissions"

15. EPA's letter of 1 February 2000 encouraged the State to review major-source and minor-source emission inventories for sulfur dioxide. (Exhibit 17.) In this instance, minor sources are oil and gas production wells of western North Dakota. Historically, the representation of sulfur dioxide emitted by these sources in application of modeling changed as shown in figures 2 and 3 attached.

a. Historical modeling protocols, which modeled only changes in emitted sulfur dioxide, did not include the sulfur dioxide emitted around the PSD baseline minor source baseline date. (Figure 2 attached.) For example, EPA's calculated PSD baseline 90th percentile 24-hour emission rates for major sources totaled 21,072 pounds per hour, current-period 24-hour emission rates totaled 52,525 pounds per hour and increment-affecting 24-hour emission rates totaled 31,453 pounds per hour. (Table 3-4 of exhibit 8.) In addition, the rates for sources that ceased operation after the PSD baseline totaled 2,576 pounds per hour (253 grams per second); however, the numbers for the retired sources are not 90th percentile 24-hour emission rates, but are annual averaged rates. (Table 3-6 of exhibit 8.)

b. As EPA notes in paragraphs 17 through 20 on pages 8 through 10 of exhibit 57, cycling of oil and gas production activity likely resulted in a cycling – increase followed by decrease – of ambient sulfur dioxide; thus, likely causing the rise

and decline in ambient sulfur dioxide concentrations during the1980s at the site of the monitor in the Theodore Roosevelt National Park-North Unit.

c. EPA does not discuss calculation of emission rate increases or decreases for minor sources. [12] (Paragraph 46 on pages 21 and 22 and paragraphs 58, 59 and 60 on pages 25 and 26 of exhibit 57.) Calculation of an emission rate change for each oil and gas production well subsequent to PSD baseline is impractical due to the numerous number of such sources.

d. The State did review the sulfur dioxide emissions of major and minor sources. [13] (Exhibits 4 and 6.) The State's modeling protocol is its first inclusion of comprehensive inventories of emitted sulfur dioxide around the PSD minor-source baseline date and preceding the date of concern.

16. "EPA believes any increment analysis should follow the same methodology for determining [sulfur dioxide] emissions in the base year as in the current year, particularly where like data are available, as is the case here ... If different methodologies were used to determine emissions for the base year and the current year, comparing the two data sets would produce inappropriate conclusions ..." (Page 23 of exhibit 8, words inserted.)

a. For the increment-expanding sources that were retired after the PSD minor source baseline date, EPA used an annual average rate previously calculated by the State. (Exhibit 8, pages 30 and 31.) The State subsequently revised emission rates for some baseline sources. (Exhibit 4.)

b. For major sources constructed after the PSD major source baseline date, EPA used 24-hour emission rates that

When discussing baseline emissions, EPA states: "To determine baseline concentration, EPA's regulations require the use of actual emissions." (Exhibit 57, paragraph 42.) "The definition of actual emissions requires that actual emissions as of a particular date shall equal the average rate at which the unit actually emitted ..." (Id, paragraph 43.) *EPA does not explain why it applies this definition to retired PSD baseline sources and not to other sources.*

[12] In exhibit 8, EPA states: "The current EPA modeling does not include emissions, either increment expanding or increment consuming, from these sources. EPA intends to incorporate NDDH's revised oil and gas emissions inventory, if available, into the final modeling analysis." (Footnote 7 on page 17.)

[13] The State has undertaken additional review of PSD-baseline emissions of minor and major sources per Findings and Conclusions of the 6 May 2002 hearing.

reflect the ambient concentration averaging time of the PSD Class I area 24-hour increment. (Exhibit 57, paragraphs 27 and 28.) EPA chose the 90th percentile of 24-hour averaged CEM sulfur dioxide emission rates for the current-period emissions of major sources. [14] (Exhibit 57, paragraph 29 and exhibit 8, pages 17 through 28.)

c. For major sources in operation before the PSD major source baseline date, EPA also used 24-hour emission rates that reflect the ambient concentration averaging time of the PSD Class I area 24-hour increment. It again chose the 90th percentile of 24-hour averaged CEM sulfur dioxide emission rates for the current-period emissions of major sources. (Paragraph 29, and exhibit 8, pages 18 and 19.)

   i. Then, it transposed the ratio of the 90th percentile 24-hour rate to the annual average rate from current-period emissions to an annual rate for baseline emissions so as to estimate the 90th percentile of baseline 24-hour rates. (Exhibit 8, pages 22 through 24.)

   ii. EPA used EPA's AP-42 method for calculating PSD baseline sulfur dioxide emissions and 1976-1977 coal-consumption and coal-sulfur data. (Exhibit 8, pages 22 through 24.) The State also used the AP-42 method. [15] (Exhibit 4.) However, the State did not calculate 90th percentile rates for baseline emissions.

d. The largest, next largest, third largest, etc., of a source's CEM hourly emission rates (such as pounds per hour) are: 99th percentile, 90th percentile, 90th percentile of 24-hour block averaged rates, annual average during operating hours and annual average over all hours. (For example, table 3 of exhibit 33.) The 99th percentile hourly rate is exceeded 1% of the year or during 88 hours. Similarly, the 90th percentile hourly rate is exceeded 876 (or for leap years 878) hours.

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[14] EPA states: "Many industries emit at higher levels during certain time of the year to meet short term demands for their products. In instances where industries emit at higher levels during certain times of the year, EPA has included the short term criteria to ensure that seasonal and intermittent operation of source which have significant short-term emissions will be subject to review. This is particularly true for the electric power industry where emissions can vary hourly or daily depending upon the demand for power ..." (Exhibit 57, paragraph 28, citation omitted.) "For example, the State's approach would not consider a summer heat wave situation in which local power plants are operating at or near peak load, coincident with winds blowing toward Class I areas." (Paragraph 29.)

[15] Since the May 2002 hearing, the State has examined calibration of the 30S factor in the AP-42 method with current period CEMS data and believes that the 30 can justifiably be revised for some units of baseline power plants.

e. The emission rates of minor sources must be expressed as time-averaged rates. The State's protocol provides apples-to-apples emission rates for major and minor sources expressed as annual averages as shown in figure 1 attached so as to avoid inappropriate increment-consumption conclusions. Presentation of modeling protocol results as in figure 4 attached would reveal likely contributions of minor and major sources to ambient sulfur dioxide.

Regarding NAAQS compliance assessment. The State compared 90th percentiles of actual sulfur dioxide emissions to annual average emissions during operating hours. (Exhibit 33, tables 3 and 5b.) The hourly sums of source concurrent actual emissions exceeded the sum of major-source annual averaged emissions during operating hours only 26.4 percent of all hours. (Id., page 3.) And, the 90th percentile of hourly sums of source concurrent actual emissions exceeded the sum of major-source annual averaged emissions during operating hours by only 7.72 percent. (Id., table 5b [41,925.7/38,921.9].)

Regarding PSD increment-consumption assessment. EPA believes that the State's approach of calculating an annual average sulfur dioxide emission rate reflecting operating hours "significantly" underestimates increment consumption. (Exhibit 57, paragraphs 27 and 29.) The heat-input capacities of the combustion systems of the coal-fired electrical generation units (tables 1 and 2 of exhibit 33) constrain worst-case sulfur dioxide emissions. Therefore, the worst-case hourly CEM emission rates, such as the 99th percentile, likely remain similar when an operator increases the utilization of a system heat-input capacity. [16] (See figures 5, 6 and 7 attached.) However, the 90th percentile, 80th percentile and the annual average of hourly emission rates become less similar – trending to larger values and, respectively, to larger differences – as operators increase the utilization of rated, maximum heat-input capacities. As a consequence, EPA's method of estimating 90th percentile baseline emission rates likely underestimates these rates when utilization of combustion capacity has increased from PSD baseline to current period or overestimates these rates when utilization of capacity has decreased.

Regarding model performance. Correlation of predicted ambient concentrations with field monitored concentrations must be assessed by performance testing of the Calpuff model. *While the State concludes that an annual emission rate averaged during operating hours is necessary due to the definition for "actual emissions" and regulatory history (Exhibit 2.), performance tests of model protocol have not been completed so as to demonstrate that EPA's*

[16] Given that heat-input capacities of coal-fired boilers are constrained, data could be assembled to confirm that the 99th percentile of annual hourly CEM emission rates have not changed significantly.

90^{th} percentile rates would result in better correlation with monitored concentrations. (Additional discussion provided elsewhere in this document.)

17. "EPA is concerned that the baseline emissions estimates prepared by the State overstate the level of baseline emissions." (Exhibit 57, paragraph 41.) At FR 45, page 52714, EPA explained the scope of discretion when applying the definition of "actual emissions": "An actual emissions policy, however, does allow air quality impacts due to production rate increases to sometimes be considered as part of the baseline concentration. If a source can demonstrate that its operation after the baseline date is more representative of normal source operation than its operation preceding the baseline date, the definition of actual emissions allows the reviewing authority to use the more representative period to calculate the source's actual emission contribution to baseline concentration. EPA thus believes that sufficient flexibility exists within the definition of actual emissions to allow any reasonably anticipated increases or decreases genuinely reflecting normal source operation to be included in the baseline concentration." (emphasis added)

    a. In exhibit 57, EPA interprets the scope of discretion originally provided in its Preamble for 1980 PSD rules. (Paragraphs 43 and 44, see also page 21 of exhibit 8.)

        i. Specifically, EPA believes that its 1990 Draft New Source Review Workshop Manual, as well as letters dated before and after 1990, limits the discretion to "catastrophic occurrences such as strikes, retooling, industrial accidents and other major catastrophic occurrences." (For example, page A.39 of this manual.)

        ii. Based upon NDAC 33-15-15-01.1.d, EPA claims that "it is inappropriate for the State's final increment modeling analysis to include increases after the minor source baseline date."

        iii. However, the baseline concentration is an "adjusted ambient concentration" due to timing of the construction and commencement of the operation of stationary sources preceding the PSD minor source baseline date. (Prevention of Significant Deterioration – Workshop Manual. EPA, OAQPS, RTP. October 1980. Page I-C-3.)

        iv. Furthermore, preconstruction monitoring data for ambient sulfur dioxide represent existing emissions. A State rule states: "With respect to any ... air contaminant ... the [pre-application] analysis must contain continuous air quality monitoring data gathered for purposes of determining whether emissions of that air contaminant [due to a new major source or major

modification] would cause or contribute to a violation of the standard or any maximum allowable increase." [17] (NDAC 33-15-15-01.g.(c), words inserted.)

b. The State gives deference to EPA's 1980 federal register's guidance on application of "actual emissions" when determining "baseline concentration". The State's selections of post-PSD-baseline two-year periods for normal operation for some sources are consistent with that FR guidance. The State provided a thorough discussion of assessment of normal operations for each baseline source. (Exhibit 4.) The baseline sources included coal-fired electric steam-generating plants, two natural gas processing plants, two oil refineries and a charcoal briquette plant. "In determining normal operations, the Department decided that actual pollutant emissions should not be a direct factor in the decision process. Production rates appear to be the factor which defines normal operations." (Id., page 12.)

The State also assembled design and 2000-2001 operating data for each of the 13 coal-fired electric-generating units in the state. (Tables 1 through 4 in exhibit 33.) Ratios of annual heat-input (from coal data) to rated heat-input capacity for years 1975 through 2000 are illustrated in figures 5, 6 and 7 attached. (These ratios do not represent actual time trends of emitted sulfur dioxide, unless other factors such as coal sulfur, combustion systems and emission control systems were steady-state .)

i. Time trends for the heat-input ratios for PSD baseline coal-fired electric-generating units are shown in figures 5 and 6. The State considered utilization of heat input capacities during years 1978, 1979 and 1980 after the minor source baseline date (19 December 1977) in determinations of normal operations, as well as utilization preceding the baseline date. Utilization of heat-input capacity during these three years increased for some sources and decreased for others. For those sources for which such utilization increased, the State selected a two-period after 1977 from among the three years as more representative of normal operations. Those sources were Leland Olds Station-Unit 2, GRE Stanton Station-Unit 1, and Milton R. Young Station-Units 1 and 2. (Exhibit 4, page 78.)

ii. Time trends for the annual ratios for sources constructed after the "major source baseline date" are shown in figure 7. These sources were not

[17] Rules or EPA guidance offer no clues to sorting the fraction of the existing highest second-highest ambient sulfur dioxide that may represent consumption of a PSD increment.

operating and emitting sulfur dioxide at the PSD minor source baseline date.

18. Column two on page 52718, FR 45, states: "The two-year period of concern should generally be the two years preceding the date as of which increment consumption is being calculated, provided that the two-year period is representative of normal source operation. The reviewing authority has discretion to use another two-year period, if the authority determines that some other period of time is more typical of normal operation than the two years preceding the date of concern." (emphasis added)

    a. The State's source inventory for the current period (a.k.a. two-year period of concern) includes major sources operating during years 2000 and 2001 and minor sources operating during year 2000. (Exhibit 4.)

Regarding – tracking changes in short-term ambient concentrations

19. EPA's preferred modeling protocol does not include calculation of the "baseline concentration" for each PSD Class I area. Instead, EPA compares model-predicted changes in ambient sulfur dioxide concentrations for each sequential time block at each model receptor to the corresponding PSD Class I increment (for example, figure 4 of exhibit 57). [18] These changes in concentrations were obtained by modeling changes in the sulfur dioxide emission rates of major sources.

    Each model-predicted change in ambient sulfur dioxide concentration rests on an unspecified concentration at PSD baseline – for every sequential time block at every model receptor. For example, the total air quality at a model receptor is the sum of the concentration at baseline for a specific time block at that receptor and the subsequent incremental air quality increase, or decrease, during that time block at that receptor. [19]

    The basis for EPA's method of tracking PSD increment consumption seems to be :

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[18] Conceptually, the maximum number of exceedances of the PSD 24-hour increment is the product of 365 (or 366) and the number of receptors in the model's receptor network. When increment exceedances occur, adding more receptors increases the potential for more exceedences.

[19] The source scenario under which EPA's protocol might suffice would require no sources in operation preceding the PSD major source baseline date. In the state's source scenario, there were several operational sources at that time. Thus, each change in sulfur dioxide concentration for each sequential time block at each receptor requires the precept that model predicted concentrations are reasonably paired-in-time with ambient monitored concentrations. But, the model does not provide reasonable, paired-in-time associations between predicted and observed ambient sulfur dioxide concentrations. (Appendix B of exhibit 6.)

i. "Total ambient concentrations ... consist of two components, baseline concentration and increment concentration." (1980 Prevention of Significant Deterioration Workshop Manual, page I-C-3.) But, EPA dropped analyses for baseline concentration. (Paragraph 12.e of this document.)

ii. "... maximum changes in air quality impact must be determined on both a spatially and temporally consistent basis." (Memorandum – dated May 3, 1983, by Sheldon Meyers, Director, Office of OAQPS – in exhibit 28.) The State's model predicted concentrations are spatially and temporally consistent. (Paragraph 14.b of this document.)

iii. "... modeling must demonstrate that allowable increments are not exceeded temporally and spatially, i.e., for all receptors for each time period throughout the year(s). (Section 11.2.3.3(b) of exhibit 14 as cited in paragraphs 27 and 34 of exhibit 57.) Presumably, EPA means that the use of models must demonstrate the extent to which increments may or may not be exceeded temporally and spatially, etc., since models don't manage the emissions of sources.

EPA's protocol seems one dimensional; it addresses air quality deterioration but not air quality improvement. *For example, how would this protocol, apparently developed for NSR, address a scenario where the only changes in emissions of sources after the PSD minor source baseline date were decreases?*

Apparently, EPA believes that the concentration at PSD baseline for every sequential time block at every model receptor is also the "baseline concentration". The 365 (or 366) sequential daily concentrations at a receptor at PSD baseline range from background, when contributions to concentrations by PSD baseline sources are zero, to larger values. And, each receptor has a set of daily concentrations at baseline. More specifically, EPA's exhibit 8 ignores the spatial variation of concentrations among a network of receptors during a meteorological time block due to major-source emissions occurring at PSD baseline, which are about 40% of the sum of emissions occurring during current period (paragraph 15.a of this document). Exhibit 8 also ignores the temporal variability among sequential time blocks. *The spatial and temporal variability of concentrations at PSD baseline likely could be demonstrated with the State's PSD baseline data set (see paragraph 14 in this document).*

Additional cues for tracking air quality deterioration, or improvement, follow.

When conducting site-specific, pre-construction ambient monitoring, "... the data should be presented in summary format showing the highest and highest, second

highest concentrations for pollutants with short-term standards and the appropriate long-term average associated with each standard. These concentrations effectively describe the existing ambient concentrations within the impact area attributable to actual emissions from existing sources." (1980 PSD Workshop Manual, pages I-C-22 and 23, emphasis added.) The bench mark for post construction tracking of deterioration, or improvement, with ambient monitoring are the highest and highest, second highest short-term concentrations (assumes more than one monitor) from pre-construction monitoring.

Similarly, the baseline concentration is "... the reference point for determining air quality deterioration in the area." (Draft 1990 New Source Review Workshop Manual, page C.6, emphasis added.)

The "baseline concentration" is defined as "... the ambient concentration level which exists in the baseline area at the time of the minor source baseline date." (NDAC 33-15-15-01.1.d as well as paragraph 43 on page 20 of exhibit 57, emphasis added.)

Baseline concentration is an adjusted ambient concentration level. For example, the baseline concentration includes expected emissions of major sources commencing construction before January 6, 1975, that are not in operation as of the PSD minor source baseline date. (45 FR No. 154, page 52,714.)

For the class I area, the maximum allowable increase in concentrations of sulfur dioxide over the baseline concentration shall not exceed 5 ug/m3 for the 24-hour period, except such maximum allowable increase during one 24-hour period per year is permitted. (CAA § 163(a) and (b)(1) as well as exhibit 2.) No reference is made in the CAA to an air quality model receptor.

Therefore, "baseline concentration" can be determined and subsequent deterioration (consumption of PSD increments), or improvement, in worst-case (second highest) sulfur dioxide concentrations can be tracked as in paragraph a or b below.

a. With the data set from modeling emitted sulfur dioxide around PSD baseline, the State (i) first calculated a "baseline concentration" for sulfur dioxide as the second-highest receptor-network average concentration among the 365 (or 366 for leap years) sequential time blocks. With the data set from modeling emitted sulfur dioxide preceding the date of concern, the State (ii) calculated the receptor-network average concentration for each of the sequential time blocks. When a current-period concentration at step (ii) exceeds the baseline concentration at step (i) by 5 ug/m3, an increment exceedance occurs. [20] [This alternative reduces to the alternative in paragraph b below when there is only

[20] This procedure provides results identical to application of the MAAL as used in exhibit 6.

one receptor in the receptor network, such as in the Theodore Roosevelt National Park-Elkhorn Ranch Unit.] Conceptually, the maximum number of exceedances is 365 (or 366).

b. An alternative would have been to (i) first determine the highest of second-highest concentrations from among all model receptors and all sequential time blocks due to PSD baseline emissions and (ii) then subtract that number from all concentrations for all sequential time-blocked concentrations at each receptor due to current emissions. When a current-period concentration at a receptor at step (ii) exceeds the baseline concentration at step (i) by 5 ug/m3, an increment exceedance occurs at that receptor. Conceptually, the maximum number of exceedances is the product of 365 (or 366) and the number of receptors in the receptor network.

c. The calculation of increment exceedances in paragraphs a and b above presumes that the background concentrations in both time lines are the same. The background concentration is due to distant or other sources of sulfur dioxide that are not included in emissions inventories. The background concentration for sulfur dioxide in western North Dakota is about 1.3 ug/m3. (Exhibit 52.)

The discussion in paragraphs a, b and c above also applies to the 3-hour PSD Class I area increment.

When one or more current-period concentrations in PSD Class I areas are greater than the baseline concentration, worst-case air quality has deteriorated. When all current-period concentrations are less than the baseline concentration, air quality has improved. In either instance, the information is not provided by EPA's preferred modeling protocol.

The methods of assessing occurrences of deterioration of ambient sulfur dioxide in paragraphs a and b above use the model to demonstrate the extent to which an increment may be exceeded temporally (per EPA guidance quoted above). More specifically, the methods demonstrate whether any current-period concentration occurring during the sequential time blocks throughout the year(s) exceed the sum of the baseline concentration and the PSD Class I area increment.

Regarding – model receptor network averaging

20. EPA asserts that the State's approach of using the statistical average (mean) receptor concentration for each sequential time block results in substantially lower changes in concentrations for comparison to the PSD increment. (Exhibit 57, paragraphs 27 through 30.) In EPA's approach of modeling sources' changes in sulfur dioxide emission rates, the second-highest change in concentration at a receptor among many

receptors during a block of time – among sequential time blocks throughout a year – conceivably can be greater than the statistical average of the changes in concentrations at those receptors during that time block. The question should be asked and answered in the context of paragraphs 19.a and 19.b with the procedure that follows:

a. First, model each sulfur dioxide emissions inventory so as to bypass the assumption in EPA's protocol – that its modeling approach produces the same result in predicted changes in each sequential time-blocked ambient sulfur dioxide concentration at each of the model's receptors as would calculating changes using the results of modeling of each source emission inventory.

Concerns that relate to receptor-network averaging in the State's protocol must be resolved as applied in tracking air quality deterioration from concentrations at PSD baseline, rather than in the context of EPA's historic protocol or its Exhibit 8.

b. Then, from the modeling results data set for each of the two inventories, (1) identify the second-highest concentration among receptors during each sequential time block and (2) calculate the average receptor concentration for each time block. The two second-highest concentrations during a meteorological time-block, one for each respective emissions inventory, may not occur at the same receptor.

The question becomes: For each sequential time block, is the magnitude of the apples-to-apples difference between the second-highest concentrations due to the two respective emissions inventories comparable to the magnitude of the difference between the calculated receptor-network averages? A corollary question is: Which set of differences for the year(s) – between second-highest concentrations or between receptor-network averages – indicates greater deterioration, or improvement? These questions likely could be answered with the State's data sets (see paragraph 14 in this document). These differences represent deterioration, or improvement, of sulfur dioxide concentrations subsequent to the PSD minor source baseline date for the respective time blocks. The State's baseline concentration is taken as the second high concentration among all sequential time blocks from results of modeling the baseline emissions inventory, see paragraphs 19.a and 19.b of this document.

21. Presumably, ambient air quality concentrations predicted by the model at a single model receptor represent the air quality concentrations at the place of that model

receptor and do not represent the air quality concentrations at other places in the PSD Class I area. [21]

a. Because ambient concentrations generally decrease as distance from the point of release to the atmosphere increases, the highest concentrations usually occur at the perimeters of PSD Class I areas. Model receptors on high terrain at the perimeter of Class I areas may capture worst-case concentrations; [22] but a Cartesian grid of receptors across the areas is necessary so as to eliminate a media sampling bias in statistical descriptions of receptor concentrations for the areas. [23] (See also paragraph 25.b of this document.)

b. However, consider the hypothetical situation where a model receptor is placed a few meters from another model receptor. In essence, the concentrations of sulfur dioxide at each receptor would be very similar – resulting in sulfur dioxide concentration data for the two model receptor locations that are not independent, but having high paired-in-time correlation. In this situation, traditional counting of exceedances of the PSD Class I increments would result in double counting of exceedances. (Exhibit 8, page 10 and tables 4-1 through 4-7.) When exceedances are tabulated from model-predicted sulfur dioxide concentrations at each model receptor,

   i. *One question is: What are the model receptor separation distances that likely would avoid duplication of counting of exceedances?* [24]

   ii. *Another question is: Do some tabulated numbers of exceedances by year for PSD Class I areas, as in EPA's exhibit 8, reflect or overstate actual exceedances?*

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[21] An appropriate statistical test applied to the 365 temporal time-blocked (e.g., 24-hour) concentrations at two nearby model receptors might show that concentrations occurring over the year at the two model receptors are not significantly different.

[22] For discussion of model receptor locations, see part 8.2.2 in EPA's Guideline on Air Quality Models (exhibit 14), page 15 of the IWAQM Phase 2 Summary Report (exhibit 29), and page 11 of the FLAG Phase I Report (exhibit 18).

[23] Since the May 2002 hearing, the State has developed a Cartesian grid of model receptors for three of the PSD Class I areas in North Dakota.

[24] The answer may reflect the distances between sources emitting sulfur dioxide and each of the PSD Class I areas. (Exhibit 6, figure 1-1, which does include locations of minor sources.)

The State circumvents resolution of answers to these questions with a statistical average of sulfur dioxide concentrations at receptors in the model's receptor network for each sequential time block, as in paragraph 19.a above, when tracking consumption of the PSD Class I increments. (Exhibit 6, pages 34 through 37.)

Double counting of increment exceedances when tracking increment consumption via paragraph 19.b can be avoided by tabulating only the number of time blocks (24-hour or 3-hour) during which an exceedance occurred at one or more network receptors.

22. *Furthermore, EPA, nor the State, has not shown, graphically or statistically, the spatial variation and range (lowest and highest) of the second-highest short-term sulfur dioxide concentration for the receptors in any Class I area. The spatial variation and range likely could be demonstrated with the State's data sets (see paragraph 14 in this document).*

The highest second-highest short-term (3-hour or 24-hour) sulfur dioxide concentration among model receptors is an inappropriate indicator of potential effects on Air Quality Related Values (AQRVs) and visibility, when it overstates the amount of ambient sulfur dioxide throughout the remaining PSD Class I area. The FLAG Phase I report identifies two specific indicators of potential pollution impact on vegetation, soils and surface water – namely, ozone and deposition. (Exhibit 18.)

a. The DOI's FLMs have not identified ambient sulfur dioxide thresholds or critical load values that would cause an adverse impact due to one or more exposure events (for example, the 24-hour day) for any of the state's PSD Class I areas.

b. Deposition is generally not specific to the location of one model receptor, but when significant across sensitive watersheds may acidify surface waters. (Id., pages 4 and 133.) The DOI's FLMs have not identified any places (sub-areas) in the state's PSD Class I areas that might be more sensitive to ozone and deposition. (Id, page 12 and pages 131 through 136 in volume I of exhibit 48.)

c. Visibility of scenic vistas depends upon the color changes or light extinction (units of distance $^{-1}$) over the light pathway between the observer and the vista. (Id, pages 26 and 27.) Visibility also is not specific to the location of a single model receptor

Therefore, the State's use of a statistical average of sulfur dioxide concentrations at receptors in the model's receptor network for each sequential time block when tracking

consumption of the PSD Class I increments reflects spatial attributes of deposition and visibility. [25]

Regarding – consistency between NAAQS, PSD and FLAG

23. Apparently, EPA views application of a modeling protocol for NAAQS compliance demonstration and a modeling protocol for PSD Class I area increment consumption as having common practices in use of most model input, model receptors and model output. (For example, paragraph 25 on page 12, paragraph 28 on page 14, paragraph 35 on page 16 and paragraph 40 on page 19 of exhibit 57.)

    a. When discussing the State's Calmet/Calpuff performance test, EPA does not compare apples to apples when relating its method of increment consumption modeling, which predicts the highest second-highest change in concentrations, to total ambient concentrations of the performance test. (Transitional paragraph from page 11 to page 12 of exhibit 8.) Similarly in exhibit 57, EPA uses the words concentration or concentrations without qualification that it likely means changes in concentrations from modeling emission rate decreases or increases. [26] (For example, paragraph 25 on page 12 and paragraph 40 on page 19.) The exceptions are paragraph 37 on page 17 and figure 4 on page 36, which labels the Y-axis as "Increment Concentration."

    b. Paragraph 34 on page 16 typifies the contradictions when EPA states in one sentence "...one should determine whether the net change in increment consuming emissions since the baseline date has resulted in pollutant concentrations exceeding the PSD increment ...[,]" while a subsequent sentence in that paragraph states "Increment consumption calculations must reflect only the ambient pollutant concentration change attributable to increment-affecting emissions." (emphasis added in both quotes)

    c. Modeling of the inventory of emitted sulfur dioxide preceding the date of concern per the State's protocol resolves the conflict described in paragraphs a and b above. This modeling:

        i. Provides information also useful for determinations of compliance with the sulfur dioxide NAAQS.

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[25] The State's calculated receptor network averages are not true representations of mean concentrations across PSD Class I areas, because locations of receptors were not randomly placed or uniformly spaced as on a Cartesian grid. (Exhibit 6, pages 34 through 37.)

[26] For sources that began operation after the PSD minor-source baseline date, the change in emission rate is the same as the current period emission rate.

ii. Provides the total (a.k.a. cumulative) ambient concentrations needed by DOI's federal land managers (FLMs) for AQRV impact assessments.

iii. Is consistent with EPA's Guideline on Air Quality Models, which does not describe modeling changes in emission rates.

iv. Avoids developing the two emissions inventories recommended by IWAQM – one for PSD increment analyses and another for AQRV analyses. (Page 57 of exhibit 29.)

v. Provides predicted ambient concentration data sets for future assessments of air quality deterioration or improvement. The data sets can be appended by modeling only new sources or source modifications. (Page 56 of exhibit 29.)

24. The State's rules at NDAC 33-15-15-01.4(f,g,h,i&j) and at NDAC 33-15-19-02.2 do not establish one method for air quality impact assessments for New Source Review (NSR) and PSD and another for FLMs' AQRVs and visibility analysis. The State's rule at NDAC 33-15-15-01.4.j requires that the State provide FLMs with "all information relevant to the permit application" for a proposed major stationary source or major modification – irrespective of status of consumption of PSD Class I increments.

25. A duty of DOI's FLMs is to ascertain whether expected, total ambient sulfur dioxide concentrations might have adverse impacts on AQRVs. (Pages 127 through 129 and pages 159 and 160 in volume I of exhibit 48.)

a. The Federal Land Managers' Air Quality Related Values Workgroup (FLAG) – Phase I Report dated December 2000 states: "A cumulative air quality analysis in which the proposed source and any recently permitted (but not yet operating) sources in the area are modeled is an important part of any AQRV impact analysis. This cumulative modeled impact is then added to measured ambient levels (to the extent that such monitoring data are available) so that the FLM can assess the <u>total effect of the anticipated ambient concentrations on AQRVs</u>. <u>If no representative monitoring data are available, the applicant should estimate the total pollutant concentrations by modeling emissions from contributing sources in the area</u>." (Exhibit 18, page 12, emphasis added.)

b. The FLMs then note that the information they receive from NSR permit applicants per EPA's historical approach requires them to leap from data on

changes in concentrations to total (a.k.a. cumulative) concentrations. [27] "Whereas the permit applicant calculates changes in pollutant concentrations, deposition rates, or visibility extinction, the FLM assesses the extent to which these impacts affect sensitive, visual, aquatic, or terrestrial resources. ... In making an adverse impact finding, FLMs consider such factors as magnitude, frequency, duration, location, and timing of impacts, as well as current and projected conditions of AQRVs based on cumulative impacts." (Id, page 12.)

26. The term receptor is an extension of exposure paradigms. AQRVs are valued ecological resources in PSD Class I areas; these resources are ecological receptors that may or may not be affected by exposure to pollutants. When assessing the exposure of AQRVs to ambient sulfur dioxide, a PSD Class I area arguably is the receptor, because DOI's FLMs have not identified specific places within the state's Class I areas where an AQRV is uniquely sensitive to sulfur dioxide. (Exhibit 18, pages 12 and 166.)

    a. The word "receptor" is used only once in NDAC 33-15, and that place is at NDAC 33-15-15-01.2.b. The PSD increments are set for "... areas designated as class I, II, or III ...," but one exceedance of short-term increments is allowed "... per year at any receptor site."

    b. AQRVs include vegetation, soil and water. These AQRVs can be impacted through deposition of primary or secondary pollutants. Ambient sulfur dioxide data obtained from a Cartesian grid of model receptors would describe the true exposure of the PSD Class I receptor area.

    c. The Cartesian grid should be scaled to a size adequate to properly characterize model-predicted ambient concentrations over a PSD Class I receptor area in statistical terms, such as the maximum, second highest, mean (a.k.a. average), range and standard deviation. [28] (See also lines 9 through 22, page 146, in volume I of exhibit 48.)

    d. In one prior Air Quality Effects Analysis, the State did provide a statistical frequency distribution of model predicted sulfur dioxide concentrations at a Cartesian grid of model receptors. (Exhibit 22.) In one prior assessment for adverse impacts, the DOI's NPS concluded "[a] cumulative frequency of occurrence analysis of the measured SO2 data shows that high concentrations are episodic and do not represent typical conditions. Half the hourly values are

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[27] EPA modeled only 31,453 pounds per hour of its calculated total current-period, major-source 24-hour emission rate of 52,525 pounds per hour. Minor sources were not included.

[28] The State has developed a 2-kilometer Cartesian receptor grid for several PSD Class I areas per Findings and Conclusions of the 6 May 2002 hearing. Back in 1981-1982, the State's model receptor network for these areas was a Cartesian grid of about 5 kilometers. (Exhibits 22, 23 and 24.)

... below the minimum detectable limit of the instruments (5 ug/m3)." (Exhibit 13, 47 FR 30222.)

Regarding – air quality management

27. EPA's historic approach does not provide information for administrators of Air Quality Programs to determine whether worst-case concentrations in PSD Class I areas have deteriorated or improved, as described in exhibit 52 by the State. This approach can lead PSD program administrators to conclude a PSD increment has been exceeded at a model receptor (figure 4 in exhibit 57), even though the total ambient concentrations on days having deterioration exceeding an increment can be less than total ambient concentrations on other days – whether at that same receptor or at other receptors (as illustrated with figures 4-1 and 4-2 in exhibit 6).

The State's modeling protocol can be used to test strategies for improving air quality as well as assessing deterioration of air quality. Apparently, EPA's historic and preferred protocol as represented by Exhibit 8 was designed around NSR.

28. Since the mid-1970s, federal and State administrators of Air Quality Programs relied on computer models' predicted concentrations or changes in concentrations for ascertaining status of compliance with NAAQS or PSD increments. (For example, exhibits 22 through 26 and paragraph 16 in exhibit 57.) DOI's FLMs also have relied on the models' output data for assessments of impact on AQRVs and visibility. (For example, exhibit 13.) The modeling of baseline and current source inventories of emitted sulfur dioxide facilitates calculation of the contributions of sources to the baseline concentration and to current-period concentrations; for example, see figure 4 attached. This information conceivably can be useful – when anchored to law, rule, science and engineering – in managing emitted sulfur dioxide so as to achieve attainment of the PSD Class I area increments. (For example, paragraph 16 on page 8 in exhibit 57.)

29. Preferably, improvement or deterioration in ambient sulfur dioxide occurring after the PSD minor-source baseline date should be determined from ambient monitoring of sulfur dioxide concentrations in Class I areas. Because there are no measured ambient sulfur dioxide concentrations preceding the PSD minor-source baseline date (1977) or preceding 1980, the State's approach provides information by modeling major and minor sources' sulfur dioxide emissions around (reflecting normal operations) that date that suggests magnitudes of baseline concentrations for PSD Class I areas. (For

example, figure 4-1 and tables 4-1 through 4-4 [29] in exhibit 6 as well as pages 6, 7 and 8 in exhibit 52.)

Part IV: CONFINING "POTENTIAL" IN CHARACTERIZING AIR QUALITY DETERIORATION

30. EPA refers to aspects of its modeling protocol as conservative. [30] (For example, paragraph 9 on page 5.) It characterizes exhibit 8 as follows: "This study represents what EPA believes to be a reasonable, but not necessarily the most conservative, methodology to assess the status of Class I increment consumption in North Dakota ... We believe this approach also best meets the intent of the increment modeling – to characterize the potential for increment violations under realistic emissions and meteorology conditions." (Page 1 of exhibit 8, emphasis added.)

a. Citing the CAA, EPA and the DOI's NPS view a modeling result that is an exceedance of a PSD Class I increment as a violation of the CAA and rule, irrespective of time trends in ambient monitoring data and irrespective of whether or not impacts on AQRVs and visibility are adverse. (For example, lines 1 through 7 on page 63, lines 14 through 20 on page 128, line 12 on page 130 through line 15 on page 136, lines 3 through 18 on page 159, and lines 3 through 17 on page 161 in volume I of exhibit 48.)

b. EPA concludes paragraph 19 of exhibit 57 as follows: "[i]n sum, without a far more comprehensive historical monitoring record going back to 1977, the monitoring data do not provide a reliable indication of the degree of increment consumption in the Class I areas at issue here." It concludes paragraph 20 as follows: "[t]his is a major reason why dispersion modeling is the only reliable method available to determine PSD increment consumption." (emphasis added)

c. EPA's discretion favors conservative choices to capture the potential high-end predicted ambient sulfur dioxide concentrations. (Its 1980 and 1990 NSR guidelines and exhibits 14, 8 and 57.) For example,

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[29] The second-highest 24-hour baseline concentration would be the MAAL as shown in these tables less the PSD 24-hour Class I area increment of 5 ug/m3.

[30] While paragraph 9 mentions that EPA received comments during its public comment period critical of relaxing its conservative assumptions in its modeling, the paragraph does not mention nor elude to comments critical of its conservative assumptions.

i. Modeling with five years of meteorology. [31] The weather event causing the highest of "high, 2nd high" change in 24-hour sulfur dioxide at a model receptor is an unusual – or outlier – event. (Tables 4-1 through 4-4 in exhibit 8.) For example, the "high, 2nd high" value of 12.8 ug/m3 occurring during 1990 in the TRNP-South Unit is larger than the "highest" values for 1992, 1993 and 1994, which were 6.9, 8.5 and 10.1, respectively. (Table 4-1.) The 12.8 ug/m3 is not only the "high, 2nd high" value among 366 days for 1990, but also the 3rd highest of all changes in 24-hour sulfur dioxide concentrations at model receptors over the 1,827 days of the five years. [32]

ii. Model receptor placement on high terrain at perimeters of PSD Class I areas. At these locations, model predicted concentrations are likely to be greater than concentrations at lower terrain or in interiors of the areas. (Page 10 in exhibit 8 and pages 34 through 37 in exhibit 6.) Pollutant deposition on watersheds and impact on visibility are overstated when based upon predicted concentrations at such locations.

iii. Inconsistent application of "actual emissions" for baseline sources retired after PSD minor source baseline date, baseline sources continuing to operate during the current period and sources constructed after the PSD major source baseline date. (Pages 17 through 28 of exhibit 8). Substitution of annual average emission rates per definition for "actual emissions" with 90th percentile rates. Historically, sources seldom concurrently emit sulfur dioxide at respective higher hourly rates. (Exhibits 33 and 17.)

iv. Rigid application of "actual emissions" for sulfur dioxide emitted by major sources – at PSD baseline. Emission rates for some major

[31] The second exceedance of a PSD 24-hour increment at one model receptor is a probable violation of that increment. If there are no other exceedances that year and no other exceedances in any of the remaining four years, then that second exceedance is but one event in 1,827 days during the five years at that one receptor. If there are nine other receptors, then that second exceedance at the first receptor is but one event in 18,270 24-hour averaged concentrations. (As shown in exhibit 22, exceedances at model receptors occurring during the same time-block or during back-to-back time blocks of any year likely are due to the same weather transport event and, thus, are not meteorologically independent.)

[32] In order to satisfy NDAC 33-15-15-01.2.b when a second exceedance of a short-term increment occurs, increment-affecting sulfur dioxide emissions of one or more sources must be reduced – unless a variance is granted – until 1990's 12.8 ug/m3 becomes 5 ug/m3 or less. The amount of reduction of increment-affecting emissions, on average, is approximately 61 % ((12.8-5)/12.8). Whereas, the amount of emissions reduction, on average, for 1992's 5.4 ug/m3 (the lowest "high, 2nd high" among the five years) is approximately 7.4 %.

sources are based upon the two-year period preceding the PSD minor-source baseline date, rather than selection of another two-year period after that date when such two-year period is more representative of normal operations. (Paragraphs 41 through 54 of exhibit 57.)

v. Avoiding calculation of "baseline concentration". In EPA's protocol, the reference point for determining ambient sulfur dioxide deterioration or improvement – relative to PSD Class I increments – in an area is unspecified. (Paragraphs 31 through 38 of exhibit 57.) [33]

31. EPA indicates that predicted-to-observed ratios that fall within the factor-of-two criteria suggested by its guidance do not exhibit a strong bias toward under prediction or over prediction. (Exhibit 8, page 11.) EPA also recommends: "For the present, continued use of the 'best estimate' is acceptable and is consistent with Clean Air Act requirements." (40 FR 51, Appendix W, section 10.2.)

a. The words potential and expected, or "best estimate," are not synonyms; just as the words possible and probable, respectively, are not synonyms. The only constraint in discretionary choices that seek out the "potential" for increment violations are impossible circumstances.

b. Due to weather, sulfur dioxide emissions and other data uncertainty, conservative model outcome where predicted concentrations are greater than observed concentrations (unpaired in time) is desirable. When a model over predicts, discretion favoring conservative choices as listed in paragraph 30 above do not cancel but compliment.

c. When ratios of predicted to observed concentrations are +2 or less but unnecessarily larger than +1, emission control strategies to negate future violation of PSD increments may be over designed. Similarly, when concentrations are under predicted, emission control strategies may be underdesigned.

d. Over or under prediction bias does not drop out in calculation of air quality deterioration or improvement. Consider the conceptual formula that follows:

[33] EPA explains that its approach is preferable over the alternative of modeling PSD baseline and current-period source emissions inventories when it states "... there is insufficient historical information on many of the sources in the State's inventory to reliably determine baseline concentrations." (Paragraph 38.) Nevertheless, EPA assumes source characteristics were the same at PSD baseline as during the current period. And, it calculates PSD baseline emission rates, which are required to calculate changes in rates. (Exhibit 8, table 3-4.)

CC = (bcp*CPC) – (bb*BC)
where:

CC = change in concentration
CPC = current period concentrations
BC = baseline concentration
bcp and bb = bias

CC = b*(CPC– BC)
assuming that bias is the same for a wide range of concentrations.

32. EPA claims there is "no legal requirement to test Calpuff in a particular application as long as the model is used in applications for which it has been designed." [34] (Paragraph 72 of exhibit 57.) However , EPA also states: "In all applications of models, an effort is encouraged to identify the reliability of the model estimates for that particular area ..." (Part 10.1.3.b of EPA's modeling guideline, which is exhibit 14.) "... models, while uniquely filling one program need, have become a primary analytical tool in most air quality assessments. Air quality measurements though can be used in a complementary manner to dispersion models, with due regard for the strengths and weaknesses of both analysis techniques. Measurements are particularly useful in assessing the accuracy of model estimates." (Section 1.b of exhibit 14.)

A Calmet-Calpuff performance test can anchor the modeling protocol, and the user of the model, to the "best estimate" precept. Model performance should be quantified and documented.

a. One State performance test is documented in appendix B of exhibit 6.

i. When comparing model predicted concentrations to monitored actual ambient concentrations as in performance tests, all emitted sulfur dioxide must be represented in the model's predicted concentrations or in ambient background concentrations.

ii. The performance test used year-2000 hourly sulfur dioxide CEM data for major sources paired to year-2000 hourly meteorological data. [35] EPA's application of emission rates in its protocol deviated from this test when

[34] Nevertheless, EPA acknowledges the State's performance test. (Paragraph 72 of exhibit 57 and pages 11 and 12 of exhibit 8.) And, EPA chose to use most Calmet-Calpuff software user control parameters from results of the State's performance test. (Pages 13 through 16 of exhibit 8.)

[35] Pressures of time prior to the 6 May 2002 hearing prevented the State from conducting another performance assessment using annual average emission rates (grams per operating second) for major sources.

it used 90th percentile rates. Likewise, the State deviated from this test when it used annual average rates during operations.

iii. The State tuned model projected ambient sulfur dioxide concentrations to field monitored concentrations with alternate settings of some user-controlled model switches. [36] EPA refers to the State's settings as non-IWAQM settings and to IWAQM settings as "regulatory default selections". (Exhibit 8, page 36.) However, IWAQM recommends "tailored defaults for a given application." (Exhibit 29, pages A-1 and B-1.)

iv. *EPA has not described implications pertaining to results of modeling of deterioration (or improvement) of ambient sulfur dioxide in PSD Class I areas due to any deviations from this performance test protocol. Likewise, the State also has not described such implications.*

b. Once user-controlled model switches are set as in performance testing per paragraphs a.ii and a.iii above, the performance of the model as applied in assessment of air quality deterioration (PSD increment consumption) can be demonstrated by including model receptors at sites of ambient monitoring for sulfur dioxide. When modeling current-period emissions of sulfur dioxide, the estimated sulfur dioxide concentrations at sites of monitors can be graphically and statistically compared to observed ambient sulfur dioxide concentrations at those sites – after adding an appropriate background sulfur dioxide concentration to modeled concentrations. The highest 5 % of daily ambient concentrations (18 of 365 or 366) are listed in tables 1, 2 and 3.

i. Since estimated concentrations are dependent on weather data and since diagnostic and meteorological model outputs (Calmet and others) can be a source of error in atmospheric dispersion models, a comparison of Calpuff estimated concentrations to observed ambient concentrations should be completed for each version of meteorological data that is used to drive the Calpuff model. If model performance is improved with one version of meteorological data over others, that performance should be quantified and documented. *The question is: Is there evidence that the output of one meteorological model is better than the output of another?*

[36] The performance behavior of Calmet-Calpuff also has been described by IWAQM. (Exhibit 29.) The State deviated from some IWAQM recommended model user-controlled options so as to improve correlation of the model's predicted sulfur dioxide concentrations with ambient concentrations from monitoring locations in western North Dakota. (Exhibit 6.)

ii. Since the 90th percentile of 24-hour averaged CEM sulfur dioxide emissions data is larger than the annual averaged CEM emissions data as noted elsewhere in this document, a comparison of Calpuff estimated concentrations from each scenario to observed ambient concentrations should be completed. The relational performance of the model using the two emission rates should be quantified and documented. *The question is: Are estimated concentrations using the 90th percentile current-period 24-hour sulfur dioxide emission rates advocated by EPA in its exhibit 8 better correlated with observed concentrations?*

c. Representations of emitted sulfur dioxide occurring at PSD baseline should be consistent with, or comparable to, representations of emissions occurring during the current period as in attached figure 1 and as discussed elsewhere in this document.

Part V: EXHIBIT-57 FOCUSED OBSERVATIONS

The State's comments specific to each of several paragraphs within exhibit 57 follow. In many instances, EPA's remarks in exhibit 57 repeat its hearing testimony, which is recorded on pages 40 through 125 in volume I of exhibit 48. Parallel comments by EPA in exhibit 48 have not been cross-referenced to exhibit 57 below.

Paragraph 9 on page 5: EPA states, in reference to public comments received during its public comment period on its exhibit 8, "We received criticism from some commenters for being too lax (for example, ..., not using IWAQM regulatory default settings in the model. The maximum Class I increment concentrations would have increased by about 50%, and the number of violations nearly doubled, if the standard IWAQM regulatory defaults had been used in the modeling)." EPA fails to note, in conjunction with these statements, that it used Calmet and Calpuff control setting as determined by the State's performance assessment. (See paragraphs 70 and 71, pages 11 through 16 in exhibit 8 and page 91 [line 17] through page 96 [line 18] in volume I of exhibit 48.)

Paragraphs 19 and 20, pages 9 and 10: EPA does not identify what monitoring data are plotted in figure 1 on page 33. The monitoring data shown in figure 1 are apparently the second-highest one-hour concentration by year for each of four monitoring sites. If so, the data in this figure are useful for describing year-to-year trends in the annual highest one-hour concentration. Presumably, the data in that figure are not statistical characterizations of all 8760 hours (8784 in leap years) in each year and, thus, statements about trends in sulfur dioxide concentrations, in general, are not supported by the data in the figure. For example, ambient air sulfur dioxide concentrations in the Theodore Roosevelt National Park's North and

South Units are unmeasurable (less than instrument detection levels) at least 80 percent of time.

Paragraph 18, pages 8 and 9: A single pollutant transport weather event can consist of multiple sequential time blocks (for example, 3-hour or 24-hour). During one time block within a single pollutant transport weather event, the statement "... monitoring data collected at a single location is not representative of concentrations that may occur at other nearby Class I [model] receptors because SO2 concentrations can vary greatly over small distances" can be true when sources are near Class I areas. [37] (word added) But, EPA's PSD analysis models only changes in source emission rates; thus, EPA does not know expected cumulative contributions from source emissions inventories to ambient concentrations at model receptors. And, EPA has not demonstrated that the quoted statement applies to the predicted second-highest change in ambient concentration at each model receptor due to all pollutant transport weather events occurring during a year. For example, EPA has not provided a contoured map of these second-highest concentrations. (See also first and second sentences in paragraph 40 on page 19.)

Paragraphs 17 through 20, pages 8, 9 and 10: The State has not advocated substituting monitoring data in PSD Class I areas for modeling data. The State advocates using monitoring data with modeling data in assessing PSD increment consumption. EPA's discussion and conclusion suggests questions such as: is it, therefore, not supporting the monitoring of sulfur dioxide concentrations in PSD Class I areas; and does it believe that the monitoring data do not have value to DOI's FLMs assessments of impacts on AQRVs?

Paragraphs 17 through 20, pages 8, 9 and 10: The State acknowledges that monitoring data for ambient sulfur dioxide concentrations in Theodore Roosevelt National Park-North and South Units likely were influenced by emissions of oil and gas production wells. This observation provided the State with an additional incentive for assembling an inventory of sulfur dioxide emissions from oil and gas production wells around the PSD minor-source baseline date.

Paragraphs 27, 34, 35 and 36, pages 13, 16, 17 and 18 as well as table 1: The State did use temporal and spacial weather data as input to the model to determine predicted ambient concentrations at individual model receptors for each hour sequentially over the year (1990, etc.). The State then calculated block averaged concentrations for sequential 3-hour and 24-hour time blocks for the year at each individual model receptor. Finally, it then calculated the statistical average ambient concentration across the PSD Class I area for each sequential time block using the individual model receptor averages for respective time blocks.

[37] On page 10 of exhibit 8, EPA states: "Given the distances of the largest contributing sources from these Class I areas (150 - 300 km), concentration gradients would not be expected to be significant within individual areas, ..."

Paragraph 27, page 13: In the sentence "Averaging the concentrations over longer time periods eliminates short-term concentration peaks, ..." EPA apparently means averaging the emissions, given the context of remaining paragraph. The use of an average emission rate does not eliminate "short-term concentration peaks," because the primary influence on short-term concentrations – irrespective of the magnitudes of time-constant emission rates used in modeling protocols – is the dwell time of pollution plumes over Class I areas and other aspects of weather events that transport sulfur dioxide from sources to the Class I areas. (See also first sentence in paragraph 36, exhibit 33 in the docket for the 6 May 2002 hearing and the discussion which follows.)

Paragraph 27, page 13, and footnote 45: The State does believe that the SIP-approved and rule-provided definition for "actual emissions" applies and, thus, it gives deference to the rule rather than to EPA's Guideline on Air Quality Models and other references listed in footnote 45. However, the State did not divide the average hourly emission rate for the year by the average hours of operation [38] – which would lead to numbers having units such as pounds per hour squared. The State simply used CEM data for current period by calculating the average emission rate for operating hours (lb/ophr) and, for baseline, it used AP-42 without modification[39] to calculate the sulfur dioxide emitted during operating hours (lb/ophr). (See also discussion that follows.)

Paragraph 27 on page 13 (last sentence), paragraph 43 on page 20 (fourth sentence) and paragraph 30 on page 14: "... the State's definition of actual emissions is modeled after EPA's, ..." And, that definition is "[i]n general, actual emissions as of a particular date shall equal the average rate at which the unit actually emitted the contaminant during a two-year which precedes the particular date and which is representative of normal source operation." The two remaining sentences of the definition are: "The department may allow the use of a different time period upon a determination that it is more representative of normal source operation. Actual emissions must be calculated using the unit's actual operating hours, production rates, and types of materials processed, stored, or combusted during the selected time period." The qualifier "in general" in the rule definition of "actual emissions" applies to these two additional sentences, which provide avenues of discretion for selection of the two years that represent a source's normal operation. The phrase "during the selected time period" refers to the two-year period selected as representative of normal operations; thus, this phrase does not encompass short-term emission rates during the two-year period as EPA suggests.

Paragraphs 29 and 30: The State did not use an "annual average emission rate divided by 365" or "an average rate in tons per year" for major sources. It used amounts of sulfur dioxide

[38] The State's exhibit 4, when initially posted on the State's web site, had errors caused by creation of the exhibit as a PDF document.

[39] Testimony during the May 6th hearing advocated revision of the 30S factor in EPA's AP-42 method for calculating sulfur dioxide emission rates.

emitted during source operating hours, as provided by rule, which provides an emission rate (mass per unit time) in units of tons per operating hour or pounds per operating hour or grams per operating second (as used in the modeling described in exhibit 6).

Paragraphs 27 and 29, pages 13 and 14: The State's average emission rates for major sources, computed as amount emitted while operating, are not "approximately 50 percent" less than EPA's 90th percentile 24-hour averaged emission rates. (Apparently, EPA calculates emissions per day by dividing total emission for the year by 365.) The actual difference for the coal-fired power plants can be calculated from data in table 3 in the State's exhibit 33, and that difference for years 2000-2001 is only 16.9 percent.

Paragraph 28, page 14 (last sentence): See State comments regarding paragraphs 27 and 29 above.

Paragraph 29, first sentence, page 14, as well as paragraphs 27 and 30: As previously noted, the State believes that the SIP-approved and rule-provided definition for "actual emissions" applies. Nevertheless, the State has examined whether use of annual average emission rates might underestimate short-term emissions and increment consumption. (See exhibit 33.)

gg. The modeling protocol used by EPA in exhibit 8 and the protocol used by the State in exhibit 6 applied the emission rates of sources 24/7. But, sources generally do not concurrently emit sulfur dioxide at greater or lesser rates. (Table 6 in exhibit 33.) Correlation coefficients between hourly plant emissions range from -0.1 to +0.3.

b. The sum of 90th percentile of 24-hour source averaged emission rates for years 2000-2001 was exceeded by the sum of hourly concurrent emission rates 1.46 percent of time. (Table 5 in exhibit 33.)

c. EPA's approach for modeling emission rate changes of sources couples the 90th percentile current-period rate to a surrogate 90th percentile of PSD baseline rate.[40] For example, EPA calculates the emission rate change for a source as equal to Ratio times (AVEcpr minus AVEpbr), where Ratio is the 90th percentile of 24-hour averaged rates (over 365 or 366 days) divided by AVEcpr, AVEcpr is the average current period emission rate and AVEpbr is the average PSD baseline emission rate. When AVEcpr and AVEpbr are emissions per operating hour as used by the State, then Ratio becomes 1.31 for the Heskett Station, 1.18 for the Leland Olds Station, 1.15 for the M.R.Young Station, 1.18 for the Coal

[40] Heat input is limited to the nominal boiler capacity, and the utilization of that boiler heat-input capacity over the years from 1975 through 2000 is shown in exhibit 4, as well as attached figures 5, 6 and 7. Thus, the high-end rates of frequency distributions of hourly emitted sulfur dioxide are capped by the nominal heat-input capacity and the annual hours of operation of the boiler at or near that capacity.

Creek Station, 1.19 for the Coyote Station, 1.05 for the Antelope Valley Station and 1.23 for GRE's Stanton Station. (Table 3 in exhibit 33.)

Paragraph 28, pages 13 and 14: Enforceable short-term emission limits for permits can and should be continued. There is no conflict between expressions of allowable maximum short-term limits in permits under NSR and the Department's protocol for PSD increment review. The State has not suggested at any time preceding the hearing, nor in any exhibit in the hearing docket, that the three-hour maximum sulfur dioxide emission limit in each existing Permit to Operate for major sources be replaced with an average emission rate.

Paragraph 30, pages 14 and 15: The statement "[s]hort-term increments are there to protect against short-term fluctuations in emissions" seems inconsistent with exposure paradigms. Presumably, short-term increments are intended to trigger assessments by FLMs of short-term effects on AQRVs. (For example, NDAC 33-15-15-01.4(f,g,h,i&j)). However, the second sentence of paragraph 28 compounds the confusion. Nevertheless, DOI's FLMs have not demonstrated that the vegetation, soils or water can be adversely impacted by a single short-term exposure event at the place of a single model receptor.

Paragraph 34, page 16: The Calpuff model does not post process concentration data "... to determine the high second-high 24-hour average concentration at each [model] receptor for each year of [weather] data." (words added) Rather, other software are used as revealed in exhibit 6.

Paragraph 35, page 16: EPA states: "An illustration of EPA's increment modeling methodology is shown in Figure 4 ... This method is consistent with the manner in which both modeled and monitored total SO_2 concentrations are reviewed to determine compliance with the NAAQS." Because EPA's modeling method (exhibit 8) provides predicted changes in ambient concentrations (or "increment concentration" as in its figure 4) due to changes in major-source emission rates, this method does not provide total day-to-day concentrations at PSD's baseline nor does it provide total day-to-day sulfur dioxide concentrations due to current period emissions that can be used to determine compliance with the NAAQS. Therefore, EPA cannot compute and graph the sum of each day-to-day concentration at PSD's baseline and the PSD Class I 24-hour increment of 5 ug/m3.

Paragraph 35, page 17: The State's approach did not allow it "... to pick one unrepresentative data point ... to represent the baseline concentration for the entire year." The averaged time-blocked concentration for each sequential time block is not assigned to any particular model receptor. In the future, the average will be based upon a refined Cartesian grid of receptors. The State did add the PSD Class I 24-hour increment of 5 ug/m3 to the second highest of 365 (or 366 for leap years) daily averaged PSD Class-I receptor-area model predicted concentrations. (See also State's comments on paragraph 39 and the discussion that follows.)

Paragraphs 34 and 35, pages 16 and 17: The State's MAAL approach does not inflate the baseline concentration for the PSD Class I area. This approach does allow deterioration of ambient sulfur dioxide concentrations in amounts greater than 5 ug/m3 during 363 (leap years, 364) days of the year (based upon 1990 weather data, etc.). (For example, figure 4-1 in exhibit 6.) In contrast, EPA's historical method does not determine the baseline concentration, nor does it determine expected, current-period concentrations. Under that historical method, the DOI's FLMs cannot be assured that predicted changes in ambient concentrations are representative of the total (a.k.a cumulative) concentrations to which AQRVs might be exposed. Furthermore, a statistical characterization (such as frequency, duration and magnitude) of the expected cumulative ambient concentrations due to current period emissions is impossible because the inventory of current period emissions was not modeled. Yet, it's the duty of DOI's FLMs to ascertain whether expected, cumulative ambient concentrations might have adverse impacts on AQRVs. (Paragraph 25 on page 12.)

Paragraphs 34, 35, 36 and 37, pages 16, 17 and 18: Because the Calpuff's predicted concentrations are not reasonably correlated temporally with measured concentrations, modeling of increment-affecting emissions as in EPA's protocol so as to compare predicted changes in the ambient 24-hour concentration each day at each model receptor to the PSD Class I 24-hour increment is without scientific foundation and, therefore, flawed. The State's MAAL approach for determining PSD increment attainment is compatible with the State's Calpuff model performance assessment, which EPA endorsed. (Paragraph 72.) In that performance assessment, the model's predicted highest block averaged concentration is compared to the block averaged highest measured concentration – similarly for the second highest, the third highest, etc. Comparison of (1) the daily averaged PSD Class-I receptor-area ambient concentration due to the current-period inventory of emissions to (2) the second highest of daily averaged PSD Class-I receptor-area ambient concentrations as the baseline concentration due to the PSD baseline inventory of emissions is compatible with the model's demonstrated performance. Furthermore, sources of sulfur dioxide emissions in the two time line inventories have changed – some retired and some were constructed. When a current-period concentration at (1) exceeds the baseline concentration at (2) by 5 ug/m3 (PSD 24-hour sulfur dioxide increment), an exceedance occurs.

Paragraph 36, pages 17 and 18: The State's approach does not disregard variability in predicted concentrations due to changes in weather conditions. The use of the same weather data (1990, etc.) and other model inputs when modeling each emission inventory makes comparisons of statistical characterizations of air quality improvement or deterioration feasible. For example, statistics, such as the highest, the second highest, the mean, the mode, etc., can be obtained from a frequency distribution of concentrations.

Paragraph 36, pages 17 and 18, and figure 5: The State has not proposed a Class I increment; the PSD increment is set by the CAA. The State's method does set a deterioration threshold for sulfur dioxide concentrations due to current-period emissions that is the second highest of daily concentrations determined from modeling of the baseline inventory of sulfur dioxide

emissions plus 5 ug/m3. Illustrations of the State's application of the MAAL are figures 4-1 and 4-2 in exhibit 6.

Figure 4, page 36: EPA's approach has an unspecified concentration at PSD baseline for each sequential time block for each receptor. The baseline source contributions – due to non-increment-affecting emissions – to ambient concentrations at PSD baseline are not determined and shown. Total ambient concentrations of minor and major baseline sources ranges from 0 to nearly 10 ug/m3 (receptor network average) as shown on figure 4-1 of exhibit 6.

Paragraph 37, page 18: EPA has not provided a graphical or statistical demonstration that its statement "Had receptor averaging not been used [by the State] at these receptors, the baseline concentrations and the State's calculated PSD increment level would have varied significantly from receptor to receptor" is true. (words inserted) This statement contradicts the statement that "PSD regulations also require that baseline concentration be determined by establishing the ambient concentration level which exists in the baseline area ..." (Paragraph 43 on page 20.) EPA seems to freely substitute the words 'baseline concentrations' for the words 'concentrations at PSD baseline'. In the State's method, a "baseline concentration" is determined for the year for the Class I area. (For example, figure 4-2 in exhibit 6, see also the State's comment on paragraph 18.)

Paragraph 38, page 18: The statement "... there is insufficient historical information on many of the sources in the State's inventory to reliably determine baseline concentration," if accepted as true, applies to EPA's approach, since that approach also requires determining emission rates of major sources at PSD's baseline. EPA's method, which determines and then models increment-affecting emission rates, does not circumvent the uncertainty in emission rates at PSD's baseline for major sources. Furthermore, the statement "[t]he reliability of emissions data from the 1970s is less of an issue in the traditional approach for tracking increment because the PSD increment level is not dependent on the modeled baseline concentrations" ignores an assumption inherent in EPA's approach. EPA assumes that its modeling produces the same result in predicted changes in sequential time-blocked ambient sulfur dioxide concentrations at the model's receptors in PSD Class I areas as would calculating changes using the results of modeling of baseline and current-period source emission inventories.

Paragraph 38, page 18: The "baseline concentration" used in the State's MAAL method does rely on stack parameters and emissions information during PSD's baseline period. But the uncertainty in the results of modeling to calculate baseline concentrations is reduced when stack parameters and emissions information are reasonable if not factual. EPA's approach also relies on emissions information during the base-year period. (For example, tables 3-2 and 3-4 in exhibit 8.) Apparently, EPA's approach assumes that stack parameters that apply to current-period emissions of sulfur dioxide also apply to baseline emissions. (Exhibit 8.)

Paragraph 39, pages 18 and 19: Contrary to its statement on page 42 in exhibit 6, the State did not use receptor averaging so as to derive uniform predictions over each Class I area. Furthermore, the State did not consolidate model receptors to only six receptors, nor did it use only one average receptor, nor did it use a single receptor to represent each PSD Class I area (Elkhorn Ranch the exception). If the average concentration for the model's receptor network (or grid) during a time block is equivalent to the concentration at one of those receptors during that time block, the happening is a coincidence. Only a few of the "original 49 receptors" were spaced at 5 kilometer intervals – many were placed on the perimeters of PSD Class I areas. (See also related discussion provided above and below.)

Paragraph 40, page 19: The State's MAAL method does not facilitate inclusion or exclusion of one or more model receptors so as to intentionally bias model receptor-network averages. The State's receptor networks as used in exhibits 6 and 7 and by EPA in exhibit 8 are the same networks as used by the State in a 1999 modeling exercise to which EPA refers in paragraph 3 – no receptors were added or deleted. Apparently, EPA has overlooked that – prior to 1999 – receptors were added to points of high terrain in several PSD Class I areas so as to capture the worst-case changes in ambient pollutant concentrations. The issue is not whether averaging "... effectively reduce[s] the maximum predicted concentration in each Class I area, ..." but rather the appropriate method for calculation of ambient sulfur dioxide deterioration or improvement subsequent to PSD baseline. (See also related discussion provided above and below.)

Paragraphs 37, 39 and 40, pages 18 and 19: The State could have used the MAAL in an alternative way.

a. One alternative would have been to (i) first determine the second highest of the sequential time-blocked (e.g., 24-hour) averaged concentrations at each model receptor due to baseline emissions and (ii) then subtract that number from all sequential time-blocked averaged concentrations at that receptor due to current emissions (as effectively done for the Elkhorn Ranch area, since only one model receptor was used). When a current-period concentration at a receptor at (ii) exceeds the second-highest concentration at (i) by 5 ug/m3 (the PSD 24-hour sulfur dioxide increment), an exceedance occurs at that model receptor. But this alternative does not satisfy the definition for "baseline concentration," which is the ambient concentration that exists in the baseline area at PSD baseline.

b. Another alternative would have been to (i) first determine the highest of second -highest concentrations from among all model receptors and all sequential time blocks due PSD baseline emissions and (ii) then subtract that number from all sequential time-blocked averaged concentrations at each receptor due to current emissions. When a current-period concentration at a receptor at step (ii) exceeds the baseline concentration as the highest of second-highest

concentrations at step (i) by 5 ug/m3, an exceedance occurs at that receptor. This alternative satisfies the definition for "baseline concentration."

Paragraph 42, page 20: The State did calculate actual emissions around the PSD minor-source baseline date "... using the [electrical generating] unit's actual operating hours, production rates, and types of materials processed ..." (Words added, see also State's comments on paragraph 27 and the discussion that follows.)

Paragraph 45, page 21: the State concurs with the statement "[t]he program would have no meaning if source emissions were calculated randomly over a period of years ..." and notes that the state did not randomly choose the two years that represent normal baseline operations of major baseline sources. (See State's exhibit 4 and discussion that follows.)

Paragraphs 43 and 44 on pages 20 and 21 and paragraphs 53 and 54 on pages 23 and 24: EPA omits these sentences from the federal register, which precede and follow its quote: "An actual emissions policy, however, does allow air quality impacts due to production rate increases to sometimes be considered as part of the baseline concentration ... EPA thus believes that sufficient flexibility exists within the definition of actual emissions to allow any reasonably anticipated increases or decreases genuinely reflecting normal source operation to be included in the baseline concentration. (emphasis added)

Column two on page 52718, FR 45 states: "The two-year period of concern should generally be the two years preceding the date as of which increment consumption is being calculated, provided that the two-year period is representative of normal source operation. The reviewing authority has discretion to use another two-year period, if the authority determines that some other period of time is more typical of normal operation than the two years preceding the date of concern." (emphasis added) It seems that EPA's 1980 PSD Preamble does not restrict reviewing authority discretion to catastrophic occurrences such as strikes, retooling and major industrial accidents.

Paragraph 53, page 23 (also applies to paragraphs 48 through 52 on pages 22 and 23: The State did not include "... any production increases anticipated at the time of the baseline date[,]" as anticipated production could be analogous to continuous and full utilization of nominal boiler capacities of the electricity generating plants. (Exhibit 33, table 1.) For example, the State did not use permit-allowed emission rates. (Id., table 3.) Rather, the State chose the two years from among years 1975 through 1980 during which these plants achieved the greatest utilization of plant capacity based upon heat input. In these plants, heat is converted to electricity; therefore, heat input is an indicator of utilization of the plant's design capacity to produce and market power. All baseline power plants, except the Milton R. Young Unit 2, did operate at heat input rates that were greater than 70 percent of design capacity at least one year during that six-year period. The State's approach embraces a consistent plant-to-plant selection of the two-year period among those six years that most closely represents normal operations. Following these precepts, EPA notes that, in 1978 and 1979, the Stanton

plant was "... adjusting its operations to optimize efficient power production." (Paragraph 52, see also State's comments on paragraph 27 regarding the rule definition of "actual emissions" and on paragraphs 43 and 44.)

Paragraph 56, page 24 and table 2: Local lignite coal is the dominant fuel used as a source of heat for the state's power plants. The sulfur content (percent by weight) in coal ranges from about 0.4 to about 1.3 percent: the content is rarely less than 0.4 and occasionally greater than 1.3 percent. Statistical distributions of sulfur content likely are skewed with the median less than the mean – highest concentrations bias the mean. Annual lowest and highest sulfur content, as well as the average content, were provided by power plant operators on required annual emissions inventory reports; data from which the means were calculated are not available. No changes are known to have occurred in methods used to determine sulfur content. The annual average sulfur content in feed coal apparently trends higher from 1974 to 2001 for all PSD baseline plants, except the Heskett Station, which trends higher from 1974 through 1994 and thereafter trends lower. (Actual statistical regressions were not determined.) (Exhibit 4.)

Paragraph 56, page 24 as well as table 2: The State notes that mining plans were initially developed for achieving the coal feed-stock requirements to operate boilers over the life of the plant. Plant operators had access to limited data that provided concentrations (by weight) of sulfur in the coal resource at the time of plant initial start up, and that data provided some information as to the variability of the sulfur in the coal resource. The State found no evidence that mining plans or subsequent plant operations were primarily based upon coal sulfur content. Therefore, the State used an average of the sulfur content in feedstock coal over the life of the mine in use at and following the PSD minor-source baseline date. (Exhibit 4.)

Paragraph 57, page 24: The State has obtained some sodium oxide in ash concentration data. The 30S factor in AP-42 assumes that 25 percent of the sulfur in coal is scrubbed by the sodium oxide. Apparently, the 30S factor applies over a wide range of sodium oxide concentrations – from 2 to 8 percent. The regression between sodium in ash, the sulfur in coal and the stack-exhausted sulfur dioxide that may apply to data on which the 30 in 30S was derived is not known. A valid regression requires a strong correlation between the sodium oxide and the sulfur dioxide emitted; apparently such a correlation does not exist as evident by the wide range of sodium oxide concentrations to which AP-42's 30S applies.

Paragraph 46 on pages 21 and 22 and paragraphs 58 through 60 on pages 25 and 26: The State has examined additional information since its 6 May 2002, hearing. The data improved the minor-source emissions inventory around PSD's baseline. As EPA noted in paragraphs 17 through 19, ambient sulfur dioxide concentrations monitored in the Theodore Roosevelt National Park-North Unit have decreased in the years following 1982.

Figure 1. Options for representing sulfur dioxide emissions as input to the Calpuff model.

Source Cluster Category	Data Source	Rate	Attribute
PSD New Source Review	engineered potential to emit	max. short-term (lb/hr)	time constant
Major PSD sources:			
Operating at date of concern	CEMS >	EPA's 90th %ile (lb/hr)	time constant
	" >	annual ave (lb/op.hr)	time constant
	" >	hour to hour (lb/hr)	time variable
Operating at minor-source baseline date	NA (no emissions)	NA (no emissions)	NA (no emissions)
Major baseline sources:			
Operating at date of concern, and	CEMS >	EPA's 90th percentile	time constant
	" >	annual ave (lb/op.hr)	time constant
	" >	hour to hour	time variable
Also at minor-source baseline date	an. emis. inventory reports	EPA's 90th %tile (lb/hr)	time constant
		annual ave (lb/op.hr)	time constant
Retired after ms baseline date	an. emis. inventory reports	annual ave (lb/op.hr)	time constant
Oil and Gas:			
PSD (op. after baseline date)	oil & gas production reports	annual ave (lb/hr)	time constant
Op. before baseline date	oil & gas production reports	annual ave (lb/hr)	time constant

Figure 2. Historical representation of sulfur dioxide emissions in air quality effects assessments (AQEAs) for PSD Class I areas.

Source Category	Inclusion in AQEA
PSD New Source Review	from 1978 (AVS units 1 & 2) [1]
PSD Sources	see associated figure 3
Baseline Sources	
retired at baseline date	from 1999 (draft Minnkota analysis) [2]
at date of concern | > | at baseline date	for 1999 (draft Minnkota analysis) [3, *]
Oil & gas wells	
at date of concern [4]	from 1992 (DGC's amended permit)
at baseline date [4]	for 2001-2002 increment compliance assessment

[1] Emissions represented as the time-constant, maximum short-term (three-hour) potential-to-emit rate.

[2] Emissions expressed as the time-constant, annual average rate based upon source emission inventory reports.

[3] Emissions at date of concern and at baseline date represented as the time-constant difference between permit allowed 3-hr rolling average emission rate and potential peak emission rate at the baseline date based upon maximum short-term coal-feed rate and maximum coal sulfur. * However, source netting was applied at GRE's Stanton Unit 1 when Unit 10 was permitted so that both units did not exceed Unit-1's 24-hr baseline emission rate calculated as 4,416 lb/hr.

[4] Emissions expressed as an annual average rate.

Figure 3. Alternative representations of the sulfur dioxide emissions of PSD coal-fired electrical generating plants and other major sources to determine effects on ambient air quality.

Model Input Options

1. maximum short-term emission rate *****
   (time-constant rate)

2. 90th percentile of 24-hour averaged actual emission rate ++
   (time-constant rate)

3. average actual emission rate during operating hours ******
   (time-constant rate)

4. actual hour-by-hour emission rate ##
   (time-variable rate)

***** From 1977, basis for assessing Class I area impacts in PSD-NSR and in cumulative effects of other PSD increment-affecting source permit-allowed emissions; also basis for previous DOI FLM no adverse impact certifications. Represents potential worst-case emission of each PSD source, which was constructed after minor-source baseline date.

++ EPA's y-2001 alternative to 1, 3 and 4 as representing the worst-case actual emissions of the source, since sources do not concurrently emit at maximum potential emissions (i.e., # 1) as demonstrable by actual emissions (i.e., # 4).

****** Requirement of rule and regulation per assistant attorney general's legal research.

Best fit for assessing exposures of AQRVs, including visibility impairment and regional haze, because actual hourly rates relate not only to magnitudes of exposure, but also to duration and frequencies of exposure events.

Figure 4. Contributions to PSD Class I area sulfur dioxide concentrations.

Year _____
3-hr ___ or 24-hr ___ averaging period

Emission rate inputs	Attri-butes	Categorical source contributions to Class I area receptor-network averaged concentrations (ug / m3) South Unit	Elkhorn Unit	North Unit	Lostwood WA
2nd high concentration from current sources:		cc1	cc	cc	cc
PSD sources	2, 5	cc1x	cc	cc	cc
Other major sources	2, 5	cc1y	cc	cc	cc
Oil & gas production wells	2, 5	cc1z	cc	cc	cc
Baseline concentration plus increment		bci -SU	bci	bci	bci
Baseline concentration from baseline sources:		cc2	cc	cc	cc
Major sources	2, 5	cc2x	cc	cc	cc
Oil & gas production wells	2, 5	cc2y	cc	cc	cc

Attribute key:

Use example: cc2 is the sum of cc2x plus cc2y. bci-SU is the sum of cc2 and the respective PSD increment. cc1 is the sum of cc1x and cc1y and cc1z. Any cc1 greater than bci-SU is an exceedance.

Figure 5.

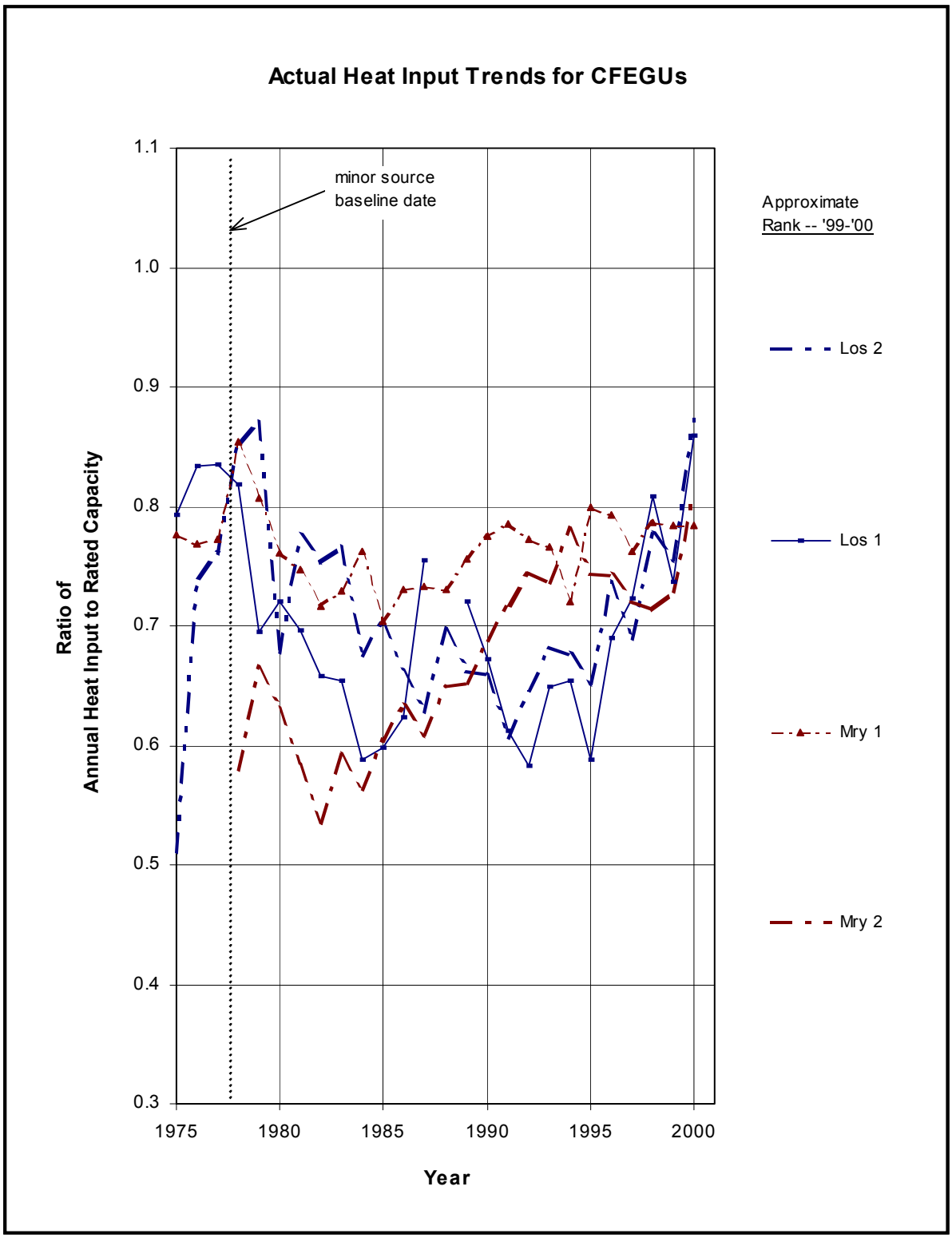

Actual Heat Input Trends for CFEGUs
minor source
baseline date
Approximate
Rank -- '99-'00
Los 2
Los 1
Mry 1
Mry 2
Ratio of
Annual Heat Input to Rated Capacity
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
1975
1980
1985
1990
1995
2000
Year

Figure 6.

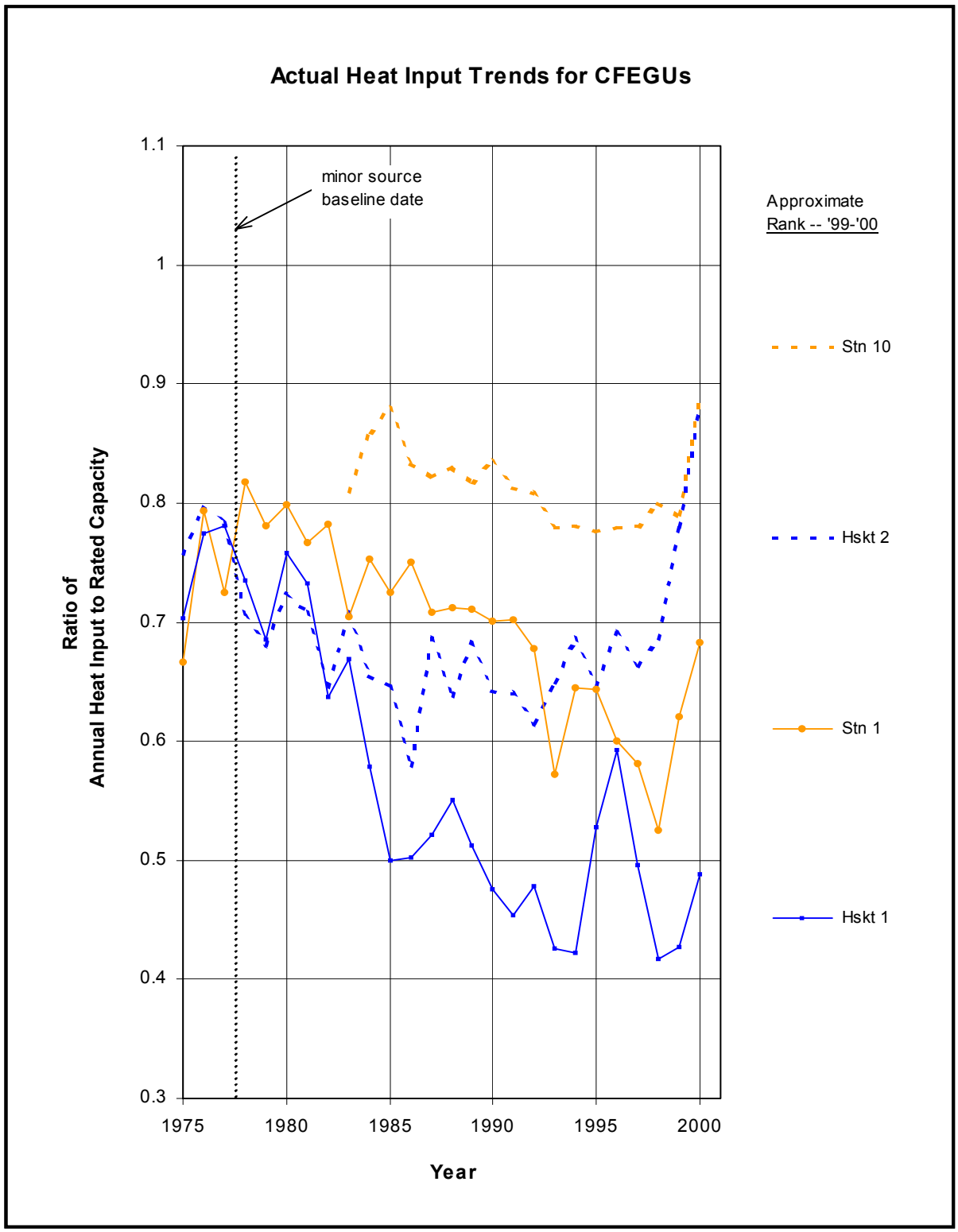

Actual Heat Input Trends for CFEGUs
Ratio of Annual Heat Input to Rated Capacity
1.1
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
1975
1980
1985
1990
1995
2000
Year
minor source baseline date
Approximate Rank -- '99-'00
Stn 10
Hskt 2
Stn 1
Hskt 1

Figure 7.

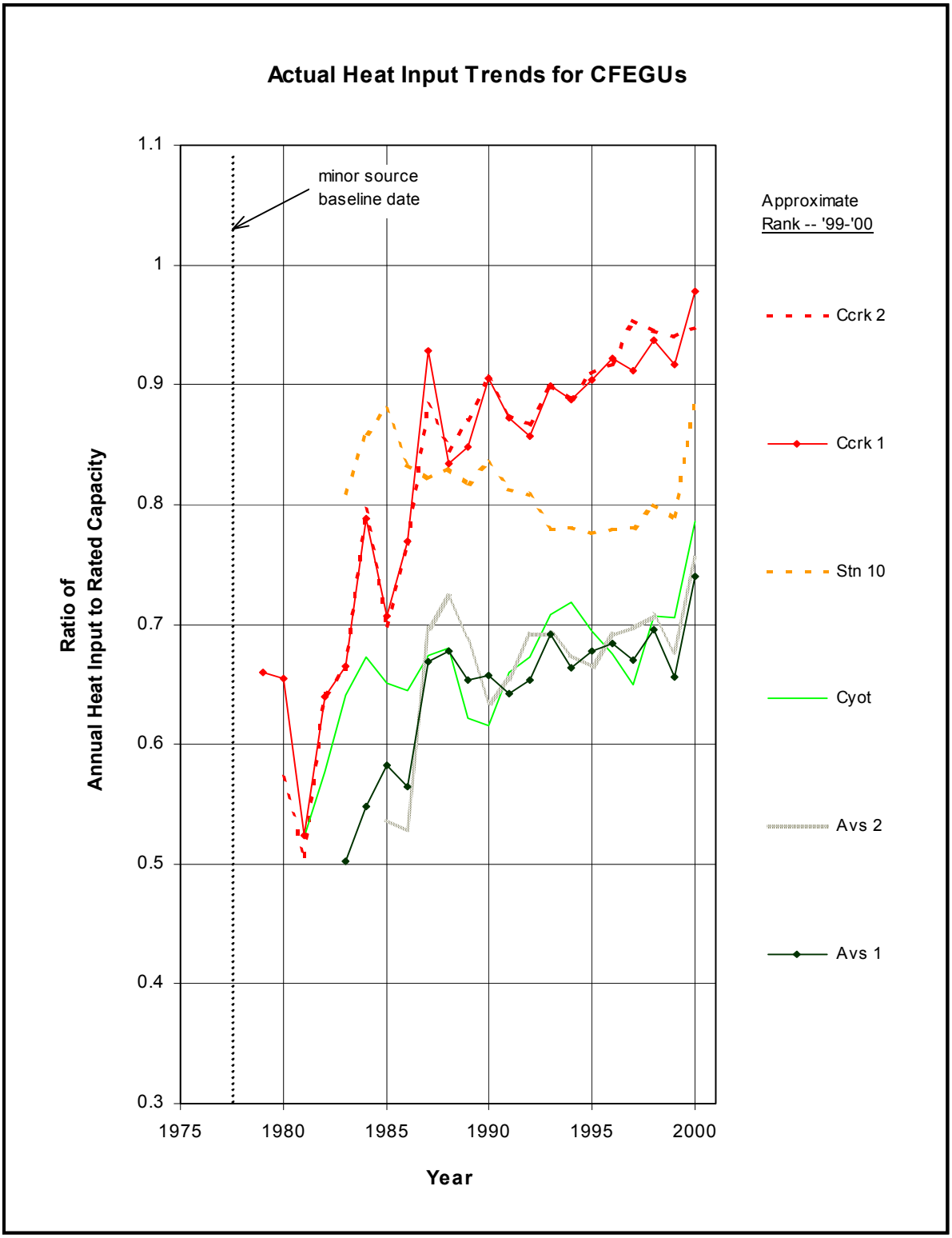

Actual Heat Input Trends for CFEGUs
minor source
baseline date
Approximate
Rank -- '99-'00
Ccrk 2
Ccrk 1
Stn 10
Cyot
Avs 2
Avs 1
Ratio of
Annual Heat Input to Rated Capacity
1.1
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
1975
1980
1985
1990
1995
2000
Year

Table 1.

Eighteen highest 24-hour average ambient sulfur dioxide concentrations for years 2000 and 1990, including Julian days of occurrence.

Year 2000

Rank	TRNP-SU			Dunn Center			Hannover		
#	ppb	ug/m3	J. Day	ppb	ug/m3	J. Day	ppb	ug/m3	J. Day
1	3.7	9.7	46	7.8	20.4	350	11.6	30.4	31
2	3.6	9.4	44	7.5	19.7	348	11.2	29.3	71
3	2.8	7.3	350	6.2	16.2	238	10.5	27.5	208
4	2.5	6.6	349	4.5	11.8	43	10.2	26.7	234
5	2.3	6.0	237	4.0	10.5	11	8.3	21.7	260
6	2.3	6.0	54	3.9	10.2	65	8.0	21.0	195
7	2.2	5.8	11	3.9	10.2	349	7.6	19.9	228
8	2.2	5.8	106	3.7	9.7	184	7.3	19.1	217
9	2.1	5.5	43	3.4	8.9	106	7.0	18.3	194
10	2.1	5.5	238	3.4	8.9	31	6.9	18.1	69
11	2.0	5.2	358	3.3	8.6	358	6.3	16.5	43
12	2.0	5.2	214	3.2	8.4	76	6.1	16.0	147
13	2.0	5.2	47	3.2	8.4	247	6.1	16.0	104
14	1.8	4.7	257	3.0	7.9	214	6.1	16.0	237
15	1.8	4.7	355	3.0	7.9	45	5.9	15.5	187
16	1.8	4.7	19	2.9	7.6	244	5.5	14.4	41
17	1.8	4.7	104	2.7	7.1	359	5.4	14.1	161
18	1.8	4.7	331	2.6	6.8	12	5.3	13.9	222

Year 1990

Rank	TRNP-NU			TRNP-SU			Dunn Center			Hannover		
#	ppb	ug/m3	J. Day	ppb	ug/m3	J. Day	ppb	ug/m3	J. Day	ppb	ug/m3	J. Day
1	4.8	12.6	329	5.5	14.4	47	5.0	13.1	336	10.7	28.0	64
2	3.7	9.7	345	3.3	8.6	90	4.0	10.5	222	9.4	24.6	149
3	3.6	9.4	31	2.2	5.8	31	3.8	10.0	231	9.3	24.4	138
4	3.4	8.9	190	2.0	5.2	46	3.6	9.4	237	8.7	22.8	47
5	3.2	8.4	69	1.6	4.2	48	3.6	9.4	47	8.4	22.0	32
6	3.2	8.4	143	1.5	3.9	5	3.5	9.2	63	7.5	19.7	65
7	3.1	8.1	330	1.5	3.9	74	3.5	9.2	166	7.3	19.1	30
8	2.7	7.1	222	1.5	3.9	79	3.0	7.9	143	6.8	17.8	90
9	2.6	6.8	47				3.0	7.9	87	6.0	15.7	147
10	2.6	6.8	315				3.0	7.9	238	5.8	15.2	48
11	2.5	6.6	360				2.9	7.6	329	5.5	14.4	139
12	2.3	6.0	11				2.8	7.3	46	5.5	14.4	63
13	2.3	6.0	30				2.7	7.1	122	5.4	14.1	66
14	2.2	5.8	74				2.3	6.0	178	4.9	12.8	87
15	2.2	5.8	46				2.2	5.8	205	4.5	11.8	168
16	2.1	5.5	92				2.1	5.5	177	4.1	10.7	167
17	2.1	5.5	344				2.0	5.2	221	4.0	10.5	161
18	2.0	5.2	122				1.8	4.7	318	4.0	10.5	49

Table 2.

Eighteen highest 24-hour average ambient sulfur dioxide concentrations for years 1991 and 1992, including Julian days of occurrence.

Year 1991

Rank	TRNP-NU			Dunn Center			Hannover		
#	ppb	ug/m3	J. Day	ppb	ug/m3	J. Day	ppb	ug/m3	J. Day
1	6.4	16.8	318	6.2	16.2	328	9.2	24.1	328
2	4.8	12.6	41	3.6	9.4	238	8.7	22.8	79
3	4.2	11.0	328	3.1	8.1	61	8.7	22.8	234
4	3.8	10.0	61	2.8	7.3	259	8.5	22.3	92
5	3.7	9.7	60	2.3	6.0	235	8.1	21.2	70
6	3.5	9.2	9	2.3	6.0	80	7.8	20.4	43
7	2.9	7.6	45	2.3	6.0	242	7.3	19.1	122
8	2.5	6.6	109	2.1	5.5	41	7.2	18.9	83
9	2.4	6.3	250	2.1	5.5	213	7.1	18.6	91
10	2.4	6.3	242	2.1	5.5	237	6.9	18.1	201
11	2.3	6.0	332	2.0	5.2	137	6.9	18.1	250
12	2.2	5.8	127	1.9	5.0	65	6.3	16.5	138
13	2.2	5.8	262	1.9	5.0	45	6.3	16.5	212
14	2.1	5.5	8	1.9	5.0	234	6.2	16.2	238
15	2.0	5.2	179	1.9	5.0	250	6.1	16.0	207
16	2.0	5.2	48	1.8	4.7	20	6.0	15.7	154
17	1.9	5.0	213	1.7	4.5	79	6.0	15.7	219
18	1.8	4.7	331	1.7	4.5	165	6.0	15.7	290

Year 1992

Rank	TRNP-NU			Dunn Center			Hannover		
#	ppb	ug/m3	J. Day	ppb	ug/m3	J. Day	ppb	ug/m3	J. Day
1	4.1	10.7	62	7.7	20.2	364	13.6	35.6	192
2	4.0	10.5	364	4.4	11.5	136	12.2	32.0	92
3	3.9	10.2	42	4.0	10.5	62	11.7	30.7	193
4	3.6	9.4	6	3.4	8.9	94	10.8	28.3	244
5	3.5	9.2	248	3.3	8.6	341	10.8	28.3	6
6	3.5	9.2	267	3.3	8.6	6	9.6	25.2	100
7	3.1	8.1	366	3.0	7.9	52	9.6	25.2	347
8	3.0	7.9	292	3.0	7.9	101	9.0	23.6	217
9	2.6	6.8	41	3.0	7.9	342	8.3	21.7	25
10	2.5	6.6	280	2.9	7.6	80	8.2	21.5	341
11	2.5	6.6	256	2.8	7.3	310	8.1	21.2	310
12	2.4	6.3	44	2.6	6.8	269	7.8	20.4	248
13	2.3	6.0	203	2.6	6.8	280	7.5	19.7	230
14	2.2	5.8	64	2.5	6.6	186	7.4	19.4	186
15	2.2	5.8	363	2.3	6.0	167	7.4	19.4	152
16	2.1	5.5	27	2.3	6.0	248	6.8	17.8	128
17	2.0	5.2	20	2.1	5.5	44	6.8	17.8	44
18	2.0	5.2	24	2.1	5.5	166	6.5	17.0	165

Table 3.

Eighteen highest 24-hour average ambient sulfur dioxide concentrations for years 1993 and 1994, including Julian days of occurrence.

Year 1993

Rank	TRNP-NU			Dunn Center			Hannover		
#	ppb	ug/m3	J. Day	ppb	ug/m3	J. Day	ppb	ug/m3	J. Day
1	7.1	18.6	51	6.0	15.7	51	10.5	27.5	97
2	4.9	12.8	8	5.3	13.9	8	10.2	26.7	168
3	4.3	11.3	222	4.7	12.3	193	10.0	26.2	348
4	3.9	10.2	360	4.4	11.5	360	9.5	24.9	333
5	3.6	9.4	29	4.3	11.3	36	9.1	23.8	41
6	2.8	7.3	344	3.8	10.0	121	9.0	23.6	38
7	2.7	7.1	9	3.6	9.4	38	9.0	23.6	152
8	2.6	6.8	223	3.5	9.2	154	8.7	22.8	86
9	2.6	6.8	14	3.1	8.1	42	8.7	22.8	280
10	2.6	6.8	22	3.0	7.9	348	8.6	22.5	268
11	2.5	6.6	42	3.0	7.9	169	8.5	22.3	14
12	2.5	6.6	361	2.9	7.6	115	8.4	22.0	178
13	2.4	6.3	350	2.8	7.3	361	8.2	21.5	36
14	2.3	6.0	351	2.5	6.6	188	7.9	20.7	277
15	2.3	6.0	158	2.4	6.3	350	7.4	19.4	8
16	2.2	5.8	179	2.3	6.0	178	7.3	19.1	273
17	2.0	5.2	55	2.3	6.0	359	7.3	19.1	196
18	2.0	5.2	178	2.3	6.0	85	7.0	18.3	365

Year 1994

Rank	TRNP-NU			Dunn Center			Hannover		
#	ppb	ug/m3	J. Day	ppb	ug/m3	J. Day	ppb	ug/m3	J. Day
1	7.8	20.4	24	6.6	17.3	23	10.5	27.5	117
2	7.5	19.7	52	5.5	14.4	59	9.0	23.6	340
3	6.3	16.5	273	5.5	14.4	273	8.9	23.3	135
4	6.1	16.0	271	4.7	12.3	38	8.9	23.3	238
5	5.8	15.2	29	4.3	11.3	4	8.3	21.7	143
6	5.6	14.7	53	4.1	10.7	329	7.1	18.6	177
7	5.4	14.1	313	4.0	10.5	9	7.0	18.3	263
8	4.6	12.1	340	4.0	10.5	8	7.0	18.3	344
9	4.2	11.0	4	4.0	10.5	125	6.9	18.1	315
10	4.0	10.5	23	3.9	10.2	29	6.9	18.1	226
11	3.5	9.2	329	3.9	10.2	96	6.5	17.0	94
12	3.5	9.2	332	3.8	10.0	339	6.4	16.8	170
13	3.3	8.6	314	3.7	9.7	52	6.1	16.0	257
14	3.2	8.4	5	3.6	9.4	277	6.0	15.7	115
15	3.2	8.4	8	3.5	9.2	53	6.0	15.7	362
16	3.1	8.1	220	3.4	8.9	39	5.9	15.5	185
17	3.0	7.9	7	3.2	8.4	332	5.8	15.2	50
18	2.7	7.1	22	3.2	8.4	256	5.8	15.2	136

B L A N K P A G E

HEARING DOCKET

ND STATE IMPLEMENTATION PLAN TO PREVENT PSD
May 6-8, 2002
Brynhild Haugland Room, State Capitol

Exhibit	Submitted By	Description
1	ND Department of Health	Summary of Legal Procedures and Issues
2	ND Department of Health	Legal Issues Relating to PSD Baseline and Increment Consumption
3	ND Department of Health	Prevention of Significant Deterioration Implementation Analysis and Sulfur Dioxide Increment Consumption Assessment Summary
4	ND Department of Health	Sulfur Dioxide Baseline Emission Rates (Draft)
5	ND Department of Health	Role of Certification of No Adverse Impact by FLM's in Setting PSD Increment Thresholds (MAAL's) (Draft)
6	ND Department of Health	Calpuff Analysis Using Actual Annual Average SO_2 Emission Rates (Draft)
7	ND Department of Health	Calpuff Analysis Using CEM Hourly SO_2 Emission Rates (Draft)
8	ND Department of Health	Dispersion Modeling Analysis of PSD Class I Increment Consumption in North Dakota and Eastern Montana (EPA)
9	ND Department of Health	Notice of Hearing
10	ND Department of Health	Memorandum - Appointment of Hearing Officer for PSD SIP Review
11	ND Department of Health	A Review of the Historical Application of PSD in North Dakota
12	ND Department of Health	Federal - State PSD and LV21 Status
13	ND Department of Health	FLM's Certifications of No Adverse Impact
14	ND Department of Health	40 CFR 51, Appendix W 7-1-99 40 CFR 51, Appendix W Proposed 4-21-00
15	ND Department of Health	ND Air Pollution Control Rules and ND Air Pollution Control Law

Exhibit	Submitted By	Description
16	ND Department of Health	Department and Industrial Correspondence Regarding PSD Issues
17	ND Department of Health	Department and EPA Correspondence Regarding PSD Issues
18	ND Department of Health	FLAG Phase I Report
19	ND Department of Health	Background, Findings of Fact and Conclusions of Law Regarding Certain Air Quality Models - 1981
20	ND Department of Health	ND - REAP Air Quality Network Report 1977
21	ND Department of Health	Air Pollution Control Research Grant Final Report for the Twelve Months Ending 9/30/77
22	ND Department of Health	Air Quality Effects Analysis Antelope Valley Station Unit 3 - 1982
23	ND Department of Health	Air Quality Effects Analysis Warren Petroleum Natural Gas Processing Plant (Expansion) - 1982
24	ND Department of Health	Air Quality Effects Analysis for Warren Petroleum Natural Gas Processing Plant - 1978
25	ND Department of Health	Air Quality Effects Analysis for Antelope Valley Station Units 1 & 2 - 1978
26	ND Department of Health	Air Quality Effects Analysis for Great Plains Synfuels Plant - 1992
27	ND Department of Health	Department's Comments on EPA Modeling Analysis
28	ND Department of Health	Unpublished EPA Interpretations of PSD Rules
29	ND Department of Health	Interagency Workgroup on Air Quality Modeling (IWAQM) Phase 2 Summary Report and Recommendations for Modeling Long Range Transport Impacts
30	ND Department of Health	Memorandum - Appointment of Hearing Officer for PSD SIP Review
31	ND Department of Health	Notice of Hearing
32	ND Department of Health	Supplementary Written Comments to Draft Memorandum "Legal Issues Relating to PSD Baseline and Increment Consumption"

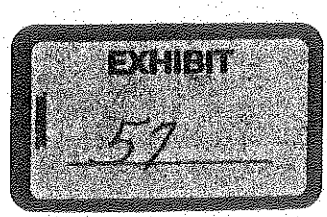
Exhibit	Submitted By	Description
33	ND Department of Health	Major Source Sulfur Dioxide Data for Years 2000 and 2001
34	Terry O'Clair, NDDOH	Testimony
35	Richard Long, EPA	Testimony
36	John Bunyak, National Park Service and U.S. Fish and Wildlife Service	Testimony
37	John Dwyer, Lignite Energy Council	Testimony
38	Susan Kahler, American Lung Association	Testimony
39	Scott Fry, Charles Kurszewski and Donna Kurszewski, Dakota Resource Council	Testimony
40	Richard A. Voss, Great Northern Power Development	Testimony
41	Robert Connery, Kirk Winges, Robert J. Hammer, Robert J. Paine, and Curt Melland	Testimony
42	James A. Mennell, Jon Sandstedt and Richard Londergan, Great River Energy	Testimony
43	Ron Day, Tesoro Petroleum Refinery, North Dakota Petroleum Council	Testimony
44	John T. Graves, Minnkota Power Cooperative, Inc.	Testimony
45	Andrea Stomberg, Montana-Dakota Utilities	Testimony
46	Jeffrey Burgess, Lignite Vision 21 Program	Testimony
47	Terry Graumann, Ottertail Power Company	Letter and Comments on Draft Dispersion Modeling Analysis
48	Emineth & Associates Court Reporters	Transcript of Hearing

Exhibit	Submitted By	Description
49	John T. Graves, Minnkota Power Cooperative, Inc.	May 15, 2002 Letter Including Additional Comments
50	ND Department of Health	Post-Hearing Written Comments on Legal Issues By Lyle Witham
51	ND Department of Health	Findings of Fact, ...
52	ND Department of Health	Rebuttal Comments
53	Florida Department of Environmental Protection	Tom Rogers Comments On Recent Report Concerning Calculation of PSD Increment In Class I Areas
54	Andrea L. Stomberg, Montana-Dakota Utilities Co.	Comments on the Adequacy of the NDDOH's SIP to PSD of Air Quality in ND's Class I Areas
55	James A. Mennell, The Environmental Law Group, Ltd.	Great River Energy's Post-Hearing Comments and Appendix of Exhibits
56	John Bunyak, U.S. Dep't of the Interior, National Park Service	National Park Service's Air Resources Division and U.S. Fish and Wildlife Service's Air Quality Branch Comments
57	Richard Long, EPA	EPA Comments on NDDOH's Proposed Determination Regarding the Adequacy of the SIP to Protect PSD Increments for Sulfur Dioxide
58	Deborah Fohr Levchak, Basin Electric Power Cooperative	Supplemental Materials Submitted by BEPC and Dakota Gasification Company
59	John W. Dwyer, Lignite Energy Council	Response to Hearing Question
60	Jeff Burgess, Lignite Vision 21 Program	Comments and Proposed Administrative Findings
61	Terry Graumann, Otter Tail Power Company	Comments

EPA COMMENTS ON NORTH DAKOTA DEPARTMENT OF HEALTH'S PROPOSED DETERMINATION REGARDING THE ADEQUACY OF THE SIP TO PROTECT PSD INCREMENTS FOR SULFUR DIOXIDE

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

May 24, 2002



Francis J. Schwindt and Douglas Bahr, Hearing Officers
Public Hearing on PSD Increment
North Dakota Department of Health
P.O. Box 5520
Bismark, North Dakota 58506-5520

Dear Messrs. Schwindt and Bahr:

1. This letter is to provide EPA's comments for the North Dakota Health Department's public hearing on the adequacy of the State Implementation Plan (SIP) to prevent significant deterioration of air quality in North Dakota. In the notice of hearing, the Department specifically solicited comments on the State's technical assessment and proposed determination that there are no violations of applicable Prevention of Significant Deterioration (PSD) increments for sulfur dioxide (SO_2) and, therefore, the SIP is adequate to prevent significant deterioration. The letter also responds to the State's request for EPA's legal analysis as it relates to the factual issues, and also addresses several of the items discussed in the State's legal analyses. EPA has reviewed the information, analysis, and issues related to the proposed determination and offers the comments below.

2. While this letter responds to North Dakota's request for comments, it is important to note that EPA is committed to keeping the lines of communication open on this matter and that discussions have been scheduled as soon as next week in our efforts to find resolution. For the past 30 years EPA and the North Dakota Department of Health have built a strong partnership based upon communications and understanding and we remain committed to continuing that partnership. We hope that these comments will help to clarify the basis for our position, which in turn will narrow our differences.

Background

3. In October of 1999, the State of North Dakota submitted to EPA for comment, a comprehensive modeling analysis of SO_2 increment consumption, using the approved Calpuff model, for several Class I areas that it completed in conjunction with a permit application by the Minnkota Power Cooperative to increase production, and consequently SO_2 emissions, at its Milton R. Young coal-fired power plant near Beulah, North Dakota.[1] The State conducted modeling for compliance with the Class I increments at all three units of Theodore Roosevelt National Park and Lostwood Wilderness Area, as well as the Medicine Lakes Wilderness Area in

[1] North Dakota Department of Health, Calpuff Class I Area Analysis for Milton R. Young Generating Station (May 24, 1999) (on file with EPA Region VIII, Denver, Colorado).

Montana and the Ft. Peck Indian Reservation Class I area. The results showed numerous violations of the SO_2 increment, both the 24-hour and 3-hour averaging times, in all four Class I areas, and the Minnkota Power Cooperative's proposed increase in emissions would contribute significantly to those violations.

4. In a February 1, 2000, letter EPA provided its review of North Dakota's modeling analysis.[2] Specifically, we stated that the Calpuff modeling methodology was technically sound and consistent with EPA's Guideline on Air Quality Models and the recommendations of the Interagency Workgroup on Air Quality Modeling[3] (IWAQM) for evaluating Class I area impacts.[4] In addition, we advised North Dakota that it should not issue the permit to the Minnkota Power Cooperative to increase production without requiring emission reductions to ensure that there would be no violations of the PSD increments. We also advised the State to correct the existing SO_2 increment violations.

5. In an April 14, 2000, letter North Dakota notified the Minnkota Power Cooperative that it would not proceed to issue a construction permit for the Milton R. Young station based on the facility's application to increase production.[5] North Dakota's decision was based in large part on the facility's impact on the existing Class I SO_2 increment violations, as well as on projected violations of the SO_2 National Ambient Air Quality Standards (NAAQS) and Class II increments in other areas. The State then performed a subsequent Class I increment analysis under various scenarios and provided the results to EPA in an email dated April 7, 2000 and a memo dated April 19, 2000.[6] The scenario of most interest to EPA was the analysis of the original results, excluding the increment-consuming emissions of the Minnkota Power Cooperative's Milton R. Young station. The results continued to indicate numerous violations of the Class I increment in all four Class I areas due to emissions from other large stationary sources in the area.

6. In January of 2001, we met with the North Dakota Department of Health to discuss the potential need for a SIP revision to correct the PSD increment violations. The State indicated the

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[2] Letter from Richard R. Long, Director, Air and Radiation Program, EPA Region VIII, to Jeffrey L. Burgess, Director, Division of Environmental Engineering, State of North Dakota Department of Health (February 1, 2000) (on file with EPA Region VIII, Denver, Colorado).

[3] The Workgroup includes modeling experts from the U.S. Forest Service, the U.S. Fish and Wildlife Service, the National Park Service, and the U.S. Environmental Protection Agency.

[4] United States Environmental Protection Agency, Office of Air Quality Planning and Standards, Interagency Workgroup on Air Quality Modeling (IWAQM) Phase 2 Summary Report and Recommendations for Modeling Long Range Transport Impacts, EPA-454/R-98-019 (December, 1998) (*available at* http://www.epa.gov/scram001/7thconf/calpuff/phase2.pdf) [hereinafter IWAQM Report].

[5] Letter from Jeffrey L. Burgess, Director, Division of Air Quality, State of North Dakota Department of Health, to John T. Graves, Environmental Manager, Minnkota Power Cooperative, Inc. (April 14, 2000) (on file with EPA Region VIII, Denver, Colorado).

[6] E-mail with attachments from Steve Weber, State of North Dakota Department of Health, to Kevin Golden and Vicki Stamper, Air and Radiation Program, EPA Region VIII (April 7, 2000) (on file with EPA Region VIII, Denver, Colorado). Memorandum from Steve Weber, State of North Dakota Department of Health, to Kevin Golden and Vicki Stamper, Air and Radiation Program, EPA Region VIII (April 19, 2000) (on file with EPA Region VIII, Denver, Colorado).

need to update and refine its modeling analysis before moving forward with examining potential measures to adopt into the SIP. Consequently, in a March 13, 2001 letter to EPA, the North Dakota Department of Health committed to update and refine its modeling analysis and to adopt revisions to its SIP as necessary to address any increment violations shown by the revised modeling analysis.[7] Specifically, the North Dakota Department of Health agreed that it would:

- Develop an air quality modeling protocol by April 1, 2001.
- Complete its modeling analysis by January 2, 2002 (or within nine months from the time EPA completed its review of the modeling protocol).
- Provide EPA with a summary of its modeling analysis by February 1, 2002.
- Complete a SIP revision to resolve the increment issue (if the modeling analysis shows that the increment is exceeded) by August 1, 2003.

EPA published an information notice to inform the public of the commitments made by the State.[8]

7. In a letter dated March 28, 2001, we advised the State that, in light of its commitment letter, we would not initiate formal action to call for a SIP revision to address these violations of the PSD increments for SO_2.[9] We acknowledged the State's desire to refine the modeling analysis to better determine the appropriate control strategies to address the violations, and we offered to work with the State in its efforts. We advised the State that if it were to not meet its commitments, or if the State and EPA were unable to agree on an acceptable modeling protocol or on acceptable control measures, we would consider initiating a formal SIP call.

8. On April 2, 2001 we received the modeling protocol from the State.[10] The protocol was not acceptable to EPA because the State did not demonstrate that the protocol would be at least as protective of air quality as a protocol developed pursuant to longstanding EPA regulation and guidance for determining increment consumption. Furthermore, the State's protocol would underestimate the amount of air quality degradation that is occurring in the Class I airsheds. We had numerous discussions with the State in April and May to try and reach an agreement on the protocol. Some of the conversations included staff and managers from the EPA Headquarters office. EPA and the Department could not reach agreement, and we sent our comment letter to

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[7] Letter from Francis J. Schwindt, Chief, Environmental Health Section, State of North Dakota Department of Health, to Richard R. Long, Director, Air and Radiation Program, EPA Region VIII (March 13, 2001) (on file with EPA Region VIII, Denver, Colorado).

[8] 66 Fed. Reg. 29127 (May 29, 2001).

[9] Letter from Richard R. Long, Director, Air and Radiation Program, EPA Region VIII, to Francis J. Schwindt, Chief, Environmental Health Section, State of North Dakota Department of Health (March 28, 2001) (on file with EPA Region VIII, Denver, Colorado).

[10] Letter from Francis J. Schwindt, Chief, Environmental Health Section, State of North Dakota Department of Health, to Richard R. Long, Director, Air and Radiation Program, EPA Region VIII (with enclosure) (April 2, 2001) (on file with EPA Region VIII, Denver, Colorado).

the State on June 25, 2001[11]. The letter expressed EPA's concern that the modeling would underestimate increment consumption because the State was proposing to model using an insufficient period of meteorology data and an inadequate characterization of source emissions. The State subsequently approached John Seitz, Director of the Office of Air Quality Planning and Standards, for advice on the matter. Mr. Seitz responded in a December 12, 2001, letter to the Department, in which he concurred with our June 25, 2001, letter.[12] During this time, the State also shared with us a draft letter it intended to send to the affected sources giving them the opportunity to provide their position concerning the baseline emission rates.[13] The State subsequently performed the modeling outlined in the protocol.[14] Despite the numerous assumptions that EPA believes would result in an underestimate of PSD increment consumption, the study still showed violations of the PSD increment in Theodore Roosevelt National Park and the Lostwood Wilderness Area.

9. When we could not reach agreement with the State on the modeling approach, EPA performed its own modeling. The draft report discussing the results of this modeling analysis was released on March 5, 2002, and the comment period closed on April 29, 2002. Although EPA's modeling analysis followed EPA regulations and procedures for most of the parameters, the EPA analysis contained several assumptions that to some extent supported the State's position. As a consequence, we received several comments during EPA's public comment period critical of those assumptions. We have received criticism from some commenters for being too lax (*e.g.*, for using 90th percentile emissions rather than maximum emission rates as required by the modeling guidelines, not using IWAQM regulatory default settings in the model. The maximum Class I increment concentrations would have increased by about 50%, and the number of violations nearly doubled, if the standard IWAQM regulatory defaults had been used in the modeling). Despite these less conservative assumptions, EPA's draft analysis still showed numerous violations in the four Class I areas, and the results were very similar to what the State showed in their original 1999 Calpuff analysis.[15]

10. On April 5, 2002 the State's draft modeling analysis and related documents became

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[11] Letter with enclosure from Richard R. Long, Director, Air and Radiation Program, EPA Region VIII, to Francis J. Schwindt, Chief, Environmental Health Section, State of North Dakota Department of Health (June 25, 2001) (on file with EPA Region VIII, Denver, Colorado).

[12] Letter from John S. Seitz, Director, Office of Air Quality Planning and Standards, EPA, to Francis J. Schwindt, Chief, Environmental Health Section, State of North Dakota Department of Health (December 12, 2001) (on file with EPA Region VIII, Denver, Colorado) [hereinafter Seitz letter].

[13] Draft letter from Francis J. Schwindt, Chief, Environmental Health Section, State of North Dakota Department of Health (June 4, 2001) (on file with EPA Region VIII, Denver, Colorado).

[14] North Dakota Department of Health, Calpuff Analysis of Current PSD Class 1 Increment Consumption in North Dakota and Eastern Montana using CEM Hourly Emission Rates Coupled with Concurrent Meteorology (March, 2002) (on file with EPA Region VIII, Denver, Colorado).

[15] United States Environmental Protection Agency, Region VIII Air and Radiation Program, Denver, Colorado, Draft Dispersion Modeling Analysis of PSD Class I Increment Consumption in North Dakota and Eastern Montana (January 2002) (on file with EPA Region VIII, Denver, Colorado).

available on the Department's web site.[16] In a letter dated April 29, 2002, Robert Roberts, Region VIII Regional Administrator, explained to Governor Hoeven that our office will continue to work with the Governor and the State staff to achieve our mutual goals.[17] The April letter also committed that EPA Region VIII would work with the State to support the Governor's Vision 21 project and to help meet the Governor's goals for clean energy projects for the future; and also asked that the Governor's staff carefully consider EPA's comments and concerns in preserving the intent of the PSD program to protect the exceptional air quality of North Dakota.

11. It appears that the State's proposed modeling effort needs revision since the State's alternative methodologies have not been demonstrated to be more appropriate than the methodologies outlined in the Federal PSD program. As a result, it appears that this proposed modeling effort cannot be used to support the proposed conclusion in the hearing notice that the State Implementation Plan (or SIP) is adequate to prevent significant deterioration of air quality for affected Class I areas.

EPA's Response to the State's Legal Issues

12. EPA's legal analysis differs from the State on many of the issues presented in the State's legal analyses placed in the State's docket for this proceeding and the legal issues articulated at the State's public hearing.[18] Although the scope of these written comments focuses primarily on EPA's concerns with the State's draft modeling analysis, EPA thinks it is important to respond to several of the issues presented in the State's analyses at this time. As appropriate, EPA may respond to the rest of the State's legal analysis at some point in the future, as well as supplement these comments and analyses provided herein.

13. EPA's PSD regulations require that the State Implementation Plan (SIP) provide for

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[16] North Dakota Department of Health, Environmental Health Section, Notice of Hearing Before the North Dakota Department of Health - Proposed Determination of the Adequacy of the North Dakota State Implementation Plan to Prevent Significant Deterioration (March 28, 2002); Prevention of Significant Deterioration Implementation Analysis and Sulfur Dioxide Increment Consumption Assessment Summary (April, 2002); Summary of Legal Procedure and Summary of Legal Issues relating to Administration of the Prevention of Significant Deterioration (PSD) Provisions of North Dakota's State Implementation Plan (SIP) (Undated), Role of Certifications of No Adverse Impact by Federal Land Managers in Setting PSD Increment Thresholds (MAALs) (Undated); Draft North Dakota Department of Health, Division of Air Quality, Calpuff Analysis of Current PSD Class I Increment Consumption in North Dakota and Eastern Montana Using Actual Annual Average SO_2 Emission Rates (April, 2002); Draft Prevention of Significant Deterioration - Sulfur Dioxide - Baseline Emission Rates (April, 2002) (*available at* http://www.health.state.nd.us/psd/).

[17] Letter from Robert E. Roberts, Regional Administrator, EPA Region VIII, to the Honorable John Hoeven, Governor of North Dakota (April 29, 2002) (on file with EPA Region VIII, Denver, Colorado).

[18] Draft Memorandum from Lyle Witham, Assistant Attorney General, State of North Dakota, to Francis Schwindt, Wayne Stenehjem and Robert Harms, State of North Dakota, "Legal Issues Relating to PSD Baseline and Increment Consumption" (January 31, 2002) (on file with the State of North Dakota) [hereinafter Witham Draft Memorandum]; Supplementary Written Comments to Draft Memorandum - "Legal Issues Relating to PSD Baseline and Increment Consumption," Prepared by Lyle Witham, Assistant Attorney General, State of North Dakota (May 6, 2002) (on file with the State of North Dakota) [hereinafter Supplementary Draft Witham Memorandum].

procedures which specify that "All applications of air quality modeling involved in this subpart shall be based on the applicable models, data bases, and other requirements specific in Appendix W of this part (Guideline on Air Quality Models)."[19] North Dakota's SIP regulations contain an equivalent provision.[20] The Guideline on Air Quality Models was incorporated by reference in the PSD regulations promulgated for the prevention of significant deterioration and the Guideline is a regulation for purposes of the PSD regulatory requirements.

14. EPA believes that consistency in the selection *and application of models* and data bases should be sought. EPA is concerned with the approach presented by the State since it does not follow the PSD and modeling rules and requirements discussed in these comments. The need for consistency has also been expressed by States and EPA Regional Offices, by many industries and trade associations, and also by the deliberations of Congress.[21] "Consistency ensures that air quality control agencies and the general public have a common basis for estimating pollutant concentrations, assessing control strategies and specifying emission limits."[22] In the early years of the PSD program, many states expressed the desire that federal regulations be promulgated in a manner which would permit all States to prevent significant deterioration without placing any individual states in unfairly advantageous or disadvantageous positions for attracting new industries.[23] EPA found it desirable to insure that industry was provided with no incentive to "shop" for areas in which efforts to prevent significant deterioration are deliberately relaxed.[24] The need for consistency has been affirmed by the courts.[25] While consistency is key, the Modeling Guidelines provide EPA with the authority to approve another technique if it can be demonstrated *to be more appropriate* than those recommended in the Modeling Guidelines.[26] As discussed in these comments, it does not appear that North Dakota has been able to demonstrate that the State's techniques are more appropriate than those followed by hundreds of previous PSD permit actions and other states' increment analyses.[27]

15. The State appears to interpret a phrase in *Alabama Power v. Costle* differently than EPA.[28] In that case, the court found that

EPA has authority under the statute to prevent or correct a violation of the increments,

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[19] 40 C.F.R. § 51.166(l).

[20] N.D. Admin. Code § 33-15-15-01(4)(f). *See also,* 40 C.F.R. § 52.1820(14).

[21] 40 C.F.R. pt. 51 Appendix W § 1.0(d).

[22] 40 C.F.R. pt. 51 Appendix W § 1.0(d).

[23] 38 Fed. Reg. 18986, 18988 (July 16, 1973).

[24] *Id.*

[25] *See, Western States Petroleum Association v. EPA*, 87 F.3d 280 (9th Cir. 1996).

[26] 40 C.F.R. pt. 51 Appendix W § 1.0(e).

[27] *See, e.g.,* Colorado Department of Public Health and Environment, Air Pollution Control Division, Technical Services Program, Air Quality Modeling Report - Periodic Assessment of Nitrogen Dioxide PSD Increment Consumption in Southwest Colorado - Phase I (October 29, 1999) (on file with EPA Region VIII, Denver, Colorado).

[28] Supplementary Draft Witham Memorandum, *supra* note 18, at 1.

but the agency is without authority to dictate to the States *their policy for management of the consumption of allowable increments.*[29]

16. EPA agrees that *management* of the consumption of allowable increments is a state decision, however, it appears we disagree with how the State defines "management." The State appears to be interpreting management to cover *all aspects* of carrying out PSD increment standards described in the Clean Air Act and federal rules. This is an overly broad interpretation of the State's management responsibilities. For example, section 163 of the Clean Air Act (Act) sets increments standards and ceilings and under this provision the State's plan is required to contain measures to assure the increments are not exceeded.[30] The State must meet this national standard. If the standard can not be met, the State is required to adopt such measures as may be necessary to prevent the increments from being exceeded. The options selected by the State to meet the standards, is the appropriate place for the State to implement its policy for the *management* of the increment. Furthermore, the Act and the rules outline EPA's oversight role if a SIP is found inadequate. Under the PSD rules, if the State or EPA determines that a plan is substantially inadequate to prevent significant deterioration or that an applicable increment is being violated, the plan shall be revised to correct the inadequacy or the violation.[31] Whenever EPA finds that a State Implementation Plan is substantially inadequate to comply with the requirements of the Act, the Act mandates that EPA require a State to revise the plan as necessary to correct such inadequacies.[32] Therefore, Congress established an oversight role for EPA when SIPs are found inadequate and a state fails correct the SIP.

I. THE STATE BELIEVES MONITORING DATA SUPPORTS THEIR POSITION THAT THE CLASS I AREAS ARE PROTECTED AND THE STATE IS IN COMPLIANCE WITH THE PSD INCREMENT REQUIREMENTS (Scope of Hearing #1)

17. The State collected SO_2 monitoring data at Theodore Roosevelt National Park-South Unit intermittently between 1980 and 1999, and at Theodore Roosevelt National Park-North Unit between 1980 and the present time. Some limited monitoring data were also collected before 1980, but these monitors were not located in the vicinity of Theodore Roosevelt National Park. The post-1980 monitoring data for North Dakota have been collected and processed and are available at the EPA AIRData website at http://www.epa.gov/air/data/index.html. In the hearing notice the State indicates its belief that the monitoring data support the position that PSD Class I areas are being protected in North Dakota.

18. EPA generally considers monitoring data unreliable for determining how much of the

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[29] *Alabama Power Company v. Costle*, 636 F.2d 323, 361 (D.C. Cir. 1980) (emphasis added).
[30] 42 U.S.C. § 7473.
[31] 40 C.F.R. § 51.166(a)(3).
[32] 42 U.S.C. § 7410(k)(5).

increment has been used up.[33] Several factors are worthy of note here. First, the year-to-year variability of air quality data limits the usefulness of certain data collected.[34] For example, by looking at monitoring data alone one cannot distinguish concentration peaks caused by emission increases from those related to meteorological variations. Second, monitoring data will include not only "increment consuming" source emissions (as defined by regulation), but also emissions from non-increment consuming sources and background level pollution.[35] Third, it is not practical to have monitors in all locations where elevated concentrations of pollutants may threaten PSD increment.[36] Fourth, models have the advantage of being able to predict pollutant and PSD increment concentrations at locations where siting of monitors may not be possible. Fifth, due to the lack of an adequate number of monitors in the early years of the PSD program (during the time period the baseline was established), if the program were to rely on monitoring it would make calculating baseline (and other aspects of the PSD program) virtually unworkable.[37] Finally, monitoring data collected at a single location is not representative of concentrations that may occur at other nearby Class I receptors because SO_2 concentrations can vary greatly over small distances. For these reasons, EPA believes that the assessment of available increment will normally be accomplished through an accounting procedure whereby modeling results will be used to keep track of the available increment.[38]

19. EPA has reviewed the historical monitoring data, and we believe that data from Theodore Roosevelt National Park-North Unit and to a lessor extent the South Unit monitor are influenced by emissions related to local oil and gas production. Some relatively large oil and gas emission sources are located approximately ten miles east of the North Unit, while a number of smaller emission sources are located within ten miles of the northern boundary of Theodore Roosevelt National Park-South Unit. The relationship between local oil and gas sources and ambient SO_2 concentrations can be seen by comparing Figures 1, 2, and 3.[39] From the Figures it can be seen that oil production for the counties closest to the Class 1 areas reached a peak in 1982 and declined in the years thereafter. This is the same pattern shown by the ambient air monitoring data shown in Figure 1. For this data, it appears that oil and gas production and SO_2 emissions/concentrations, are positively correlated. The State believes that the monitoring data support their position that the Class I increments are being protected in the four Class I areas. Unfortunately, there are no SO_2 air quality monitoring data available near Theodore Roosevelt National Park prior to 1980. However, the monitored data show a large decrease in SO_2 concentrations at Theodore Roosevelt National Park-North Unit in the two years preceding the peak concentrations measured in 1982. If that trend had continued back to the 1977 time period, coincident with the reduced oil production, concentrations in the 1976 to 1977 baseline period

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[33] 43 Fed. Reg. 26380, 26399 (June 19, 1978); 40 C.F.R. pt. 51, Appendix W § 1.0(b).
[34] 43 Fed. Reg. 26380, 26399 (June 19, 1978).
[35] *See id.*
[36] 39 Fed. Reg. 42510, 42510 (Dec. 5, 1974).
[37] *See id.*
[38] 40 C.F.R. § 51.166(l); N.D. Admin. Code § 33-15-15-01(4)(f); 45 Fed. Reg. 52676, 52678 (Aug. 7, 1980); 39 Fed. Reg. 31000, 31003 (Aug. 27, 1974).
[39] The Figures and Tables referenced in these comments appear at the end.

would have been lower than those monitored in 1980, or even in current years. This is suggestive of possible increment consumption. In sum, without a far more comprehensive historical monitoring record going back to 1977, the monitoring data do not provide a reliable indication of the degree of increment consumption in the Class I areas at issue here.

20. Also of interest are the monitoring data from Dunn Center which is also shown on Figure 1. The Dunn Center monitor is located closer to the major power plant emissions sources than the Theodore Roosevelt National Park-North Unit monitor and so is more likely to reflect impacts from these sources. However, the Dunn Center monitor is located at a greater distance from the oil and gas sources near Theodore Roosevelt National Park and should be less impacted by these emissions. The Dunn Center monitor was actually one of the sites used by the State to test model performance. These data indicate that SO_2 concentrations may have actually increased somewhat since monitoring was initiated in 1979. While not located adjacent to any of the Class 1 areas these data show how strongly monitoring data are influenced by local sources. This is a major reason why dispersion modeling is the only reliable method available to determine PSD increment consumption.

II. THE STATE IS NOT COUNTING INCREMENT CONSUMING EMISSIONS FROM THE SOURCES THAT RECEIVED DEPARTMENT OF INTERIOR (DOI) VARIANCES.

21. In their Class I increment analysis, the State is *not* counting emissions from sources that received variances from the Federal Land Manager (FLM) in the past. There are two sources which received variances from the FLM that are operating today. Those facilities are the Little Knife Gas Plant near Killdeer, ND, and the Dakota Gasification Company near Beulah, ND. These variances certified that at the time these the proposed sources received PSD permits, the proposed sources would not adversely affect the air quality related values of Theodore Roosevelt National Park and the Lostwood Wilderness Area, only (*i.e.*, there were no variances granted for the two Class I areas in Montana). We believe the State should include emissions from *all* sources in the current increment analysis.

22. The Clean Air Act is very clear that increments are to be protected: "[E]ach applicable implementation plan shall contain measures assuring that maximum allowable increase over baseline concentration of, and maximum allowable concentrations of, such pollutants *shall not be exceeded.*"[40] One of the mechanisms for protecting increment is the PSD program, authorized by section 165 of the Act, and the prohibition in that section against construction of a new major source or major modification that will cause the increment to be violated.[41] The

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[40] Section 163(a) of the Act, 42 U.S.C. § 7473(a) (emphasis added).
[41] Section 165(a)(3) of the Act, 42 U.S.C. § 7475(a)(3).

variance provision of section 165(d)(2)(C)(iii) of the Act (42 U.S.C. § 7475(d)(2)(c)(iii)) allows for an exemption from the prohibition against construction, in the case of a facility that is shown to violate Class I increments but which the Federal Land Manager determines will not have an adverse impact on the air quality related values of the affected Class I area.[42]

23. The effect of the variance provision is limited. The provision extends only to the new construction (source or modification) under consideration, allowing that construction to go forward despite a modeled Class I increment violation. Nothing in the statute suggests that such a source does not contribute to increases in concentrations of pollutants. Moreover, the variance provision does not affect the general statutory requirement that each implementation plan must assure protection of the increment. Nor does the statute or regulations suggest that the variance "wipes the slate clean" with respect to any existing increment violation to which the new construction causes or contributes. In short, the variance does not change the general statutory protections for Class I areas, and the State continues to have an obligation under the Act to protect the increment, by whatever means it may choose.

24. As the *Alabama Power* Court ruled,

> The regulations provide that once it is determined that a state implementation plan is 'substantially inadequate to prevent significant deterioration or that an applicable increment is being violated,' then the SIP must 'be revised to correct the inadequacy or the violation.' [Citation to what is now 40 C.F.R. § 51.166(a)(3).] We rule that *EPA has authority under the statute to prevent or correct a violation of the increments*, but the agency is without authority to dictate to the States their policy for management of the consumption of allowable increments.

Alabama Power Co. v. Costle, 636 F.2d 323, 361 (D.C.Cir. 1979)(emphasis added). The policy for protecting increment must necessarily include restricting pollution from existing sources to correct an increment violation even when a variance, or waiver, has been granted. As the court clarified:

> The waiver has vitality and recognition in that facilities granted special consideration under these provisions are, in effect, treated as facilities operating in compliance with the provisions of the Act. But the *totality of facilities in compliance, as a group*, may be subject to measures necessary to cope with a condition of pollutants exceeding the PSD maximum.

636 F.2d at 363 (emphasis added). Thus the Act and EPA's regulations provide that the State must revise the SIP when the increment is violated, whether or not a variance has been issued to

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[42] *See also,* 40 C.F.R. § 51.166(p)(4); N.D. Admin. Code § 33-15-15-01(4)(j)(4).

any source in any particular permitting action. As the Alabama Court made clear, the variance *only* allows such a source to be built. Any increment violation caused by the construction of such a source, however, must be corrected. The State can correct the increment violation by obtaining increment reductions from other increment consuming sources or by expanding the available increment through reductions at baseline sources.

25. Most recently, John Seitz, Director of EPA's Office of Air Quality Planning and Standards, wrote to the State on December 12, 2001 regarding this issue.[43] As explained in that letter, the FLM's job, under the Clean Air Act, is to protect Class I air quality related values, while it is the job of EPA and the States to protect the increments and the NAAQS. Under the Clean Air Act and our regulations, a permit applicant must demonstrate that the emissions from the proposed source will not cause or contribute to pollutant concentrations in excess of any applicable increment. In the case of a Class I increment violation, a source may be granted a variance under certain conditions. First, the source must demonstrate to the FLM, and the FLM certify to the State, that the source will not adversely impact any Class I air quality related values. Second, the State must revise its SIP to correct increment violations.

26. In our February 1, 2000 letter to the State, we explained our position on this issue.[44] Our interpretation is that the Class I increment still applies at the two Class I areas in North Dakota for all increment-consuming emissions that impact these Class I areas. As discussed above, we believe that the Class I variance provisions of the Clean Air Act and the North Dakota Air Pollution Control Rules allow the State to issue a PSD permit to a particular source despite a modeled increment violation, but that the State is still required to correct the Class I increment violation through a revision to the SIP. This does not necessarily mean that the PSD source which received the Class I variance has to reduce emissions to correct the increment violation. The State could correct the increment violation by obtaining emission reductions from other increment-consuming sources or by expanding the available increment through reductions at baseline sources. Thus, although the FLM granted variances for these facilities, the State should revise the SIP to correct the increment violations.

III. THE STATE USES AN "ANNUAL" EMISSION AVERAGE TO DEMONSTRATE COMPLIANCE WITH THE "24-HOUR" INCREMENT STANDARD, WHICH FAILS TO PROTECT THE 24-HOUR AVERAGE INCREMENT (Scope of Hearing #3)

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[43] Seitz Letter, *supra* note 12.

[44] Letter from Richard R. Long, Director, Air and Radiation Program, EPA Region VIII, to Jeff Burgess, Director, Division of Environmental Engineering, State of North Dakota Department of Health (February 1, 2000) (on file at EPA Region VIII, Denver, Colorado).

27. The State is using annual average SO_2 emissions for all major and minor stationary sources to calculate 3-hour, 24-hour, and annual average increment consumption. The State's approach only assures that the annual concentration of pollution has not exceeded the increments. This approach is consistent with how EPA checks for the annual increment standard. However, the State's approach is inconsistent with how EPA checks for the 3 and 24-hour increment standards and the fails to protect the statutory 3 and 24 hour increments. Averaging the concentrations over longer time periods eliminates short-term concentration peaks, which the 3 and 24-hour average increments are meant to protect. It appears that the State's approach significantly underestimates increment consumption, especially for the short-time period averages, which are usually the first, and most often, violated. It appears the State believes that because a portion of their SIP-approved definition of actual emissions states that actual emissions as of a particular date equals the average rate, in tons per year, that they should base their increment analysis on an annual average. In this approach, emissions would be calculated by dividing the average hourly emission rate for the year by the average hours of operation. Although the State's definition of actual emissions is modeled after EPA's, given other applicable rules, EPA comes to a different conclusion.

EPA's PSD rules, incorporated by reference into North Dakota's PSD rules, require that

> [S]equential modeling must demonstrate that the allowable increments are not exceeded temporally and spatially, i.e, for all receptors *for each time period* throughout the year(s) (*time period means the appropriate PSD averaging time, e.g., 3-hour, 24-hour, etc.*).[45]

28. This means that averaging times for emission rates used in PSD modeling must reflect the averaging time of the PSD increments in order to ensure protection of both the short term and long term increments. When developing the PSD program, EPA selected the increment

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[45] 40 C.F.R. pt. 51 Appendix W § 11.2.3.3 (b)(emphasis added). *See also,* 40 C.F.R. pt. 51 Appendix W § 11.2.3.3 (a), N.D. Admin. Code § 33-15-15-01(4)(f)(1), 38 Fed. Reg. 18986, 18990 (July 16, 1973), 43 Fed. Reg. 26380, 26394 (June 19, 1978). *See* United States Environmental Protection Agency, Office of Air Quality Planning and Standards, Draft New Source Review Workshop Manual, at C.69 - C.70 (October, 1990) (*available at* http://www.epa.gov/rgytgrnj/programs/artd/air/nsr/nsrmemos/1990wman.pdf) [hereinafter Workshop Manual]. *See e.g.*, Memorandum from John S. Seitz, Director, Stationary Source Compliance Division, Office of Air Quality Planning and Standards, to Air Management Division Directors, EPA Regional Offices, "Clarification of New Source Review Policy on Averaging Times for Production Limitations," (April 8, 1987) (*available at* http://www.epa.gov/rgytgrnj/programs/artd/air/nsr/nsrmemos/avetimes.pdf); Memorandum from Thomas W. Devine, Director, Air and Hazardous Materials Division, Environmental Protection Agency Region IV, to State and Local Air Directors, "Policy Determinations Regarding PSD Questions" (July 31, 1981) (*available at* http://www.epa.gov/rgytgrnj/programs/artd/air/nsr/nsrmemos/r4sum.pdf); United States Environmental Protection Agency SO_2 Guideline Document - Appendices, Office of Air Quality Planning and Standards, EPA-452/R-94-008, at 6-14 (February 1994); Memorandum from Gerald A. Emison, Director, Office of Air Quality Planning and Standards, to David Kee, Director, Air Management Division, Region V (November 24, 1986) (*available at* http://www.epa.gov/rgytgrnj/programs/artd/air/nsr/nsrmemos/shrtterm.pdf).

averaging times to be compatible with the existing new source review standards for these pollutants. The methodology of using averaging times in PSD modeling that are consistent with the averaging time of the PSD increment (e.g., a modeled 3-hour average to show compliance with the 3-hour increment standard), is consistent with EPA's requirement that enforceable emissions limits for contributing sources must be established on a short term basis to protect both the short term NAAQS and the short term PSD increments. Many industries emit at higher levels during certain times of the year to meet short term demands for their products. In instances where industries emit at higher levels during certain times of the year, EPA has included the short term criteria to ensure that seasonal and intermittent operation of sources which have significant short-term emissions will be subject to review.[46] This is particularly true for the electric power industry where emissions can vary hourly or daily depending upon the demand for power which is related to factors such as weather conditions or workday schedules. Because of these higher than average emission periods, an emission rate calculated over a full year is normally much less than the peak short term (3-hour or 24-hour average) emission rate for a given source.

29. Use of annual average emission rates in the increment modeling will underestimate increment consuming emissions and therefore will not ensure protection of the 3 and 24-hour maximum allowable increases in concentrations of SO_2. For example, the State's approach would not consider a summer heat wave situation in which local power plants are operating at or near peak load, coincident with winds blowing toward Class I areas. Annual average emissions would be appropriate for modeling the *annual* PSD increment, however, both EPA's January 2002 analysis and the State's 1999 analysis showed that the annual increment is not threatened at this time. In our modeling analysis, the 90th percentile of measured 24-hour average emissions were used to estimate the maximum, or near maximum, emissions for the major increment consuming sources. In EPA's 90th percentile approach, 24-hour average emissions were approximately 50 percent higher than the annual average emission rate divided by 365. Thus, the State's approach appears to not be protective of the 3 and 24-hour average Class I increments. Furthermore, section 163 of the Clean Air Act, (42 U.S.C. § 7473), refers to an annual arithmetic mean but a 24-hour maximum - not a 24-hour mean as suggested by the State.

30. Furthermore, the State's definition of "actual emissions," modeled after EPA's, includes the phrase "in general."[47] This means that the definition applies in some, but not all circumstances. The definition of actual emissions should not be applied in isolation, but rather it should be applied in conjunction with the rest of the PSD regulatory requirements that are in place to protect *all* the PSD averaging times. The definition of actual emissions also requires that emissions be calculated "during the selected time period," reflecting distinct averaging rates

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[46] 43 Fed. Reg. 26380, 26394 (June 19, 1978).

[47] N.D. Admin. Code § 33-15-15-01(1)(a)(1), 40 C.F.R. 51.166(b)(21) (emphasis added).

to reflect the applicable standard.[48] Finally, the use of an average rate in tons per year makes little sense in ensuring that concentrations of pollutants do not increase above the maximum allowable amount for the 3 and 24-hour periods. Short-term increments are there to protect against short-term fluctuations in emissions.

IV. THE STATE'S PSD MODELING APPROACH APPEARS TO BE TEMPORALLY INCONSISTENT, THE STATE COMPARES ONE DAY FROM THE BASELINE EMISSIONS WITH 365 DAYS OF CURRENT YEAR EMISSIONS. (Scope of Hearing #4)

31. The provisions of the PSD program were enacted by Congress in the 1977 Clean Air Act. To prevent significant deterioration of air quality, Congress set up the principle of only allowing a certain amount of increase in the ambient air concentration over the existing baseline concentration. These allowable increases are termed the maximum allowable increases over baseline concentrations in section 163 of the Act, 42 U.S.C. § 7473, otherwise known as the PSD increments.

32. The PSD increments for SO_2 are specified in section 163(b) of the Act, 42 U.S.C. § 7473(b). For Class I areas, those increments are:

Annual arithmetic mean	2 ug/m^3
Twenty-four hour average	5 ug/m^3
Three hour average	25 ug/m^3.

For any averaging period other than annual average, section 163(a) of the Act allows the increment to be exceeded during one such period per year (as such, the concentration compared to the increment is known as the "high second high"). Otherwise, section 163 of the Act provides that the increments are not to be exceeded and that the State Implementation Plan (SIP) must contain measures assuring that the increments will not be exceeded.

33. The discussion in this section concerning the methods for determining PSD increment is focused on the 24-hour Class I increment of 5 ug/m^3. The State's 1999 modeling and EPA's January 2002 modeling study both showed numerous violations of the 3 and 24-hour PSD increment standards. The number and severity of violations was greater for the 24-hour increment standard. Any control measures necessary to correct the 24-hour violations should be more than sufficient to address the 3-hour increment. Thus, the focus of this discussion is centered on the 24-hour average increment.

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[48] *Id.*

34. As discussed previously, EPA's PSD regulations and the State's regulations require the use of 40 C.F.R. Part 51, Appendix W, EPA's Guideline on Air Quality Models, for all applications of air quality modeling involving PSD.[49] EPA's Guideline on Air Quality Models requires that for PSD modeling, "sequential modeling must demonstrate that allowable increments are not exceeded *temporally* and spatially, i.e., for all receptors *for each time period* throughout the year(s)."[50] This means that to determine compliance with the PSD increment, one should determine whether the net change in increment consuming emissions since the baseline date has resulted in pollutant concentrations exceeding the PSD increment at any specific time (temporal) and location (spatial) in the current year. The amount of PSD increment that has been consumed in a PSD area is determined from the emissions increases and decreases which have occurred from sources since the applicable baseline date. Increment consumption calculations must reflect only the ambient pollutant concentration change attributable to increment-affecting emissions.[51] Specific times are used to ensure temporal representativeness which is primarily a function of the day-to-day variations in weather conditions.[52] In determining whether the 24-hour SO_2 increment has been exceeded, one should compare the modeled concentrations resulting from the net change in increment consuming emissions to the level of the PSD 24-hour average SO_2 increment on every day in the meteorological record that is modeled. In addition, one is required to use at least five years of meteorological data, as the State has done in the modeling analysis.[53] Under EPA modeling guidelines it is assumed that a continuous five year period of meteorological data would allow characterization of worst case conditions that can occur in either the baseline period or in the current year.[54] The dispersion model (in this case Calpuff) calculates daily concentrations at each Class I receptor over the minimum five year period. The model then processes the data to determine the high second-high 24-hour average concentration at each receptor for each year of data. This value is then compared to the relevant increment. In this case, the 24-hour average, the increment is 5 ug/m^3 of SO_2.

35. An illustration of EPA's increment modeling methodology is shown in Figure 4. In the example there were eight exceedances of the 24-hour increment for SO_2. This method is consistent with the manner in which both modeled and monitored total SO_2 concentrations are reviewed to determine compliance with the NAAQS. This issue of whether maximum changes in air quality impact must be determined on both a spatially and temporally consistent basis has been raised in the past. EPA's response to these questions has always been that the maximum amount of PSD increment consumed must be determined by modeling pollutant concentrations

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[49] 40 C.F.R. § 51.166(l)(1), N.D. Admin. Code § 33-15-15-01(4)(f).
[50] 40 C.F.R. Part 51, Appendix W, § 11.2.3.3(b) (emphasis added).
[51] *See also*, Workshop Manual, *supra* note 45, at C.10, C.62 - C.63.
[52] 40 C.F.R. pt. 51, Appendix W § 9.3(a).
[53] 40 C.F.R. pt. 51, Appendix W § 9.3.1.2(a).
[54] 40 C.F.R. pt. 51, Appendix W § 9.3.1.2.

sequentially for each time period.[55] The State's approach to determining compliance with the increment inappropriately inflates the baseline concentration. Under the approach proposed by the State, the State first estimates the emissions of sources in the baseline year and then use this emissions data in the Calpuff model to determine the second-high concentration of SO_2 at each receptor. The State then adds 5 ug/m^3 (the level of the Class I increment) to this value to establish a "maximum allowable ambient level." This approach allows the State to pick one unrepresentative data point (the second-highest value, one day in each year modeled)[56] to represent the baseline concentration for the entire year. The State has not explained the rational for selecting this data point. Current year emissions are then modeled with the same meteorology data. The second-high prediction for the current year is then compared to the previously determined maximum allowable ambient level. Compliance with the increment is assumed if the second-high prediction in the current year is lower than the maximum allowable ambient level. This process is repeated for each of the five years of meteorology data modeled in the State's analysis. See Table 1 for a comparison of the EPA and State of North Dakota approaches.

36. The State's draft approach disregards the significant variability in concentrations of pollutants over time due to changes in weather conditions. Thus, using this approach the State would not account for the possibility that impacts greater than 5 ug/m^3 may have occurred on days when the baseline concentration is less than the second-high value. The approach is spatially, but not temporally, consistent, and does not provide a true measure of air quality degradation. Compared to the traditional approach, this would establish 24-hour PSD increment levels of less than 5 ug/m^3 on one day per year (the day with highest baseline concentration), and increment levels greater than 5 ug/m^3 on the 363 days per year with lower baseline concentrations. The State "inappropriately pairs data" since they use only one day of baseline data, instead of the 365 days of data traditionally used, and compares that to each day of current year data. The effect of the State's proposed increment methodology compared to the traditional approach in modeling results for Theodore Roosevelt National Park-South Unit is shown in

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[55] *See, e.g.*, Memorandum from John R. O'Connor, Acting Director, EPA Office of Air Quality Planning and Standards, to Thomas W. Devine, Director Air and Waste Management Division, EPA Region IV, PSD Increment Consumption Calculations (January 20, 1984) (*available at* http://www.epa.gov/rgytgrnj/programs/artd/air/nsr/nsrmemos/clculatn.pdf); Memorandum from Sheldon Meyers, Director, Office of Air Quality Planning and Standards, to the Air Directors in the EPA Regional Offices, Emissions Trading Policy - - Technical Clarifications (February 17, 1983) *(available at* http://www.epa.gov/rgytgrnj/programs/artd/air/nsr/nsrmemos/emtradp.pdf). Memorandum from Alexandra B. Smith, Director, Air and Waste Management Division, EPA Region X, to Sheldon Meyers, Director, Office of Air Quality Planning and Standards, Determination of Air Quality Degradation (May 3, 1983) (*available at* http://www.epa.gov/rgytgrnj/programs/artd/air/nsr/nsrmemos/cnsumptn.pdf). United States Environmental Protection Agency SO_2 Guideline Document - Appendices, Office of Air Quality Planning and Standards, EPA-452/R-94-008, at 6-14 (February 1994) (available at http://www.epa.gov/ncepihom/Catalog/EPA452R94008.html).

[56] The State selected Julian Day 343, or December 9, 1990 to establish their proposed approach that uses a MAAL at Theodore Roosevelt National Park-South Unit. A different MAAL was established at Theodore Roosevelt National Park-North Unit for each year the State modeled.

Figure 5. From Figure 5 it can be seen that on most days the State's proposal would allow Class I degradation above the Clean Air Act standard of 5 ug/m^3 on 363 days. The State's approach does not provide for protection of the increment and is inconsistent with Act. If the State is unable to demonstrate that the State's methodology is more appropriate than the Modeling Guidelines, the State must revise its increment modeling to reflect the Modeling Guideline methodology.

37. EPA is also concerned about the interrelationship between receptor averaging (discussed in section V) and the variable increment approach and how it may affect computed concentrations. In reviewing the data from the previous EPA January 2002 and State 1999 Calpuff studies, there was a significant concentration gradient across both the Theodore Roosevelt National Park-North Unit and Theodore Roosevelt National Park-South Unit receptors, with highest concentrations along the eastern boundaries of these areas. Had receptor averaging not been used at these receptors, the baseline concentrations and the State's calculated PSD increment level would have varied significantly from receptor to receptor. This would lead to spatial and temporal variations in the results, and it appears that violations of the 24-hour average increment would have been predicted at several receptor sites.

38. Another concern we have with the proposed variable increment approach is that it relies on having detailed stack parameters and emissions information on sources during the 1977 base year period to determine the PSD baseline concentration. As we have outlined in Section VI, there is insufficient historical information on many of the sources in the State's inventory to reliably determine baseline concentrations. This is particularly evident for sources such as oil and gas facilities which operate sporadically, and given their close proximity to the Class I areas may significantly affect baseline concentrations. The reliability of emissions data from the 1970s is less of an issue in the traditional approach for tracking increment because the PSD increment level is not dependent on modeled baseline concentrations. The traditional approach only requires an analysis of the net change in emissions between the baseline period and the present. Estimates of the net change in emissions between base year and current year are typically more reliable than total emissions estimates that rely on a comprehensive inventory of every source in the data sparse baseline period.

V. THE STATE'S AVERAGED RESULTS APPROACH, AVERAGING THE 49 RECEPTORS INTO SIX VALUES, REDUCES THE MAXIMUM PREDICTED CONCENTRATIONS AT EACH CLASS I AREA AND APPEARS TO BE INCONSISTENT WITH EPA'S MODELING GUIDELINES. (Scope of Hearing #1)

39. We have concerns with the State's use of receptor averaging. The State indicates that receptor averaging was performed to derive uniform predictions over each Class I area. In reviewing the modeling files it appears that the 49 receptors that had been used in the State's

1999 Calpuff modeling analysis (and also used in EPA's January 2002 Draft Modeling Study) have been consolidated in the most recent State analysis through averaging to now include a total of only six receptors. It appears that the State averaged the results from the receptors in each Class I area to get an average concentration of pollutants for each area. The State's approach uses only one "averaged" receptor for each of the six Class I areas. The original 49 receptors in the State's 1999 Calpuff modeling analysis and EPA's January 2002 Modeling Study were deployed along the boundaries of the four Class I areas and were spaced at approximately 5 km intervals. Theodore Roosevelt National Park is separated into three separate geographic areas (North Unit, South Unit, and Elkhorn Ranch). The State has represented each unit of Theodore Roosevelt National Park by a single receptor. The State represents Lostwood Wilderness, Ft. Peck Indian Reservation, and Medicine Lake Wilderness Class I areas each as one receptor. The six federal Class I areas cover more than 86,000 acres.[57] The State indicates that averaging provides more uniform predictions over the Class 1 areas, but does not explain the utility of uniform predictions in this situation.

40. The proposed averaging of concentrations across individual receptors would effectively reduce maximum predicted concentrations at each Class I area, because SO_2 concentrations are not uniformly distributed. The proposal is inconsistent with EPA's Guideline on Air Quality Modeling, which states that "receptor sites for refined modeling should be utilized in sufficient detail to estimate the highest concentrations and possible violations of a NAAQS or PSD increment."[58] It is also problematic from a technical standpoint. For example, if a concentration at a given receptor exceeded the PSD increment all one would need to do to eliminate the exceedance would be to simply add a new receptor at a lower concentration location and average the results. In addition, receptor averaging loses the spatial details required by the Modeling Guidelines.[59] For these reasons, it is inappropriate for the State's final increment modeling to utilize this receptor averaging approach, unless the State can demonstrate that it is more appropriate.

VI. EPA IS CONCERNED THAT THE STATE'S BASELINE EMISSION ESTIMATES INAPPROPRIATELY COUNT INCREMENT CONSUMING EMISSIONS IN THE BASELINE. (Scope of Hearing #5)

41. EPA is concerned that the baseline emissions estimates prepared by the State overstate the level of baseline emissions. In other words, under the State's approach, increment consuming emissions are counted in the baseline. It appears that the State has misinterpreted EPA's PSD rules and the Modeling Guidelines on preparing PSD baseline emission inventories. The State's

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[57] 40 C.F.R. § § 81.417, 81.423.
[58] 40 C.F.R. pt. 51 Appendix W § 8.2.2.(a), N.D. Admin. Code § 33-15-15-01(4)(f).
[59] 40 C.F.R. pt. 51 Appendix W § 11.2.3.3(b).

baseline emissions calculations include SO_2 emissions emitted after the minor source baseline date and EPA believes these emission estimates need to be recalculated.

42. To determine baseline concentration, EPA's regulations, require the use of actual emissions.

> *Baseline concentration* means that ambient concentration level which exists in the baseline area at the time of the applicable minor source baseline date. A baseline concentration is determined for each pollutant for which a minor source baseline date is established and shall include:
> (a) The *actual emissions* representative of sources in existence on the applicable minor source baseline date, except as provided in paragraph (b)(13)(ii) of this section.[60]

The rules provide that actual emissions are to be calculated using the unit's actual operating hours, production rates, and types of materials processed, stored or combusted during the selected time period.[61] As discussed below, in several instances the State has estimated baseline emissions based on methodology that is not representative of actual emissions. EPA believes these emission estimates need to be corrected.

43. The PSD regulations also require that baseline concentration be determined by establishing the ambient concentration level which exists in the baseline area at the time of the applicable minor source baseline date.[62] North Dakota's minor source baseline date was triggered on December 19, 1977.[63] The time period used to estimate baseline emissions is further elaborated on in the definition of "actual emissions."[64] The definition of actual emissions requires that actual emissions as of a particular date shall equal the average rate at which the unit actually emitted during a two-year period which precedes the particular date and which is representative of normal source operations.[65] In EPA's judgment, two years represents a reasonable period for assessing actual source operations.[66] The rule allows the reviewing authority to use a different time period upon a determination that a different time period is more representative of normal source operation during that two-year period immediately preceding the minor source baseline date. "If a source can demonstrate that its operation after the baseline date is more representative of normal source operation than its operation *preceding the baseline date*, the definition of actual emissions allows the reviewing authority to use the more representative

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[60] 40 C.F.R. § 51.166(13) (emphasis added), N.D. Admin. Code § 33-15-15-01(1)(d).
[61] 40 C.F.R. § 51.166(21), N.D. Admin. Code § 33-15-15-01(1)(a).
[62] 40 C.F.R. § 51.166(13), N.D. Admin. Code § 33-15-15-01(1)(d).
[63] 40 C.F.R. § 51.166(b)(14)(ii).
[64] 40 C.F.R. § 51.166(21), N.D. Admin. Code § 33-15-15-01(1)(a).
[65] *Id.*
[66] 45 Fed. Reg. 52676, 52718 (Aug. 7, 1980).

period to calculate the source's actual emissions contribution to the baseline concentration."[67] EPA has indicated that this provision is to apply to catastrophic occurrences such as strikes, retooling, major industrial accidents and other catastrophic occurrences.[68]

44. The definition of baseline concentration also states that actual emissions increases and decreases at any stationary source occurring after the minor source baseline date will not be included in the baseline concentration. Rather, actual emissions increases and decreases after the minor source baseline date will affect the applicable maximum allowable increases.[69] Therefore, it is inappropriate for the State's final increment modeling analysis to include increases after the minor source baseline date.

45. An important requirement is that if an alternative two year period is selected to represent normal source operation it should represent normal operation *for the baseline period, not normal operation for the life of the source.* The PSD program is intended to prevent air quality degradation from all sources measured from a specific date (the minor source baseline date is December 19, 1977 in North Dakota).[70] The program would have no meaning if source emissions were calculated randomly over a period of years, because the estimates would not match the sources that are contributing to ambient concentrations in the base year. If for some reason data are unavailable to characterize emissions during the base year, alternative time periods may be used to better represent actual conditions *during the base year.* EPA does not support any deviations from the 1976-1977 base year unless data from alternative years provides a better estimate of emissions that actually occurred in the 1976-1977 time period. The only exception would be if some serious event occurred during those two years that would be extremely unlikely to recur in the future (such as strike, major industrial accident, or retooling), as discussed above.

46. Another concern we have related to baseline emissions estimates is the State's protocol for preparing baseline oil and gas emissions estimates. These estimates appear to be based on averaging of emissions over the brief period that the sources operate, rather than annual average emission rates. Although oil and gas sources may only operate for a period of weeks or months

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[67] 45 Fed. Reg. 52676, 52714 (Aug. 7, 1980) (emphasis added).

[68] Workshop Manual, *supra* note 45, at A.39. *See also,* Letter from R. Douglas Neeley, Chief, Air and Radiation Technology Branch, Air Pesticides, and Toxics Management Division, EPA Region IV, to John Ynterma, Georgia Environmental Protection Division, Air Protection Branch, "Establishing Emissions Representative of Normal Source Operation for Furnace E., Owens-Brockway Glass Container, Inc., Atlanta, Georgia" (March 2, 2000) (*available at* http://www.epa.gov/rgytgrnj/programs/artd/air/nsr/nsrmemos/yntema.pdf). Letter from David P. Howekamp, Director, Air Management Division, EPA Region IX, to Robert T. Connery, Esq., Holland and Hart, "Supplemental PSD Applicability Determination Cyprus Casa Grande Corporation Copper Mining and Processing Facilities" (November 6, 1987) (*available at* http://www.epa.gov/rgytgrnj/programs/artd/air/nsr/nsrmemos/cyprusca.pdf).

[69] 40 C.F.R. § 51.166(13), N.D. Admin. Code § 33-15-15-01(1)(d).

[70] 40 C.F.R. § 51.166(b)(14)(ii).

at a time, the State's approach would give them increment expansion credit as if they were operating continuously for the entire year. With the very large number of oil and gas sources, we believe it is unrealistic to assume that they would all operate at high levels all the time.

47. The specific State method for calculating baseline emissions that inappropriately define normal source operation are shown below along with our comments and recommendations for correcting them:

A. The State defines not representative of normal operations by looking at anticipated production rates (heat input per hour of operation), rather than actual emission rates.

48. EPA does not consider the concept of *anticipated* production rates to be applicable in cases where *actual* source emissions are well documented for the 1976-1977 baseline period. Such projections might be useful in instances where base year emissions are unknown. The consideration of anticipated production rates by the State increased emissions estimates for the Royal Oak Briquetting facility from 2400 tons/year in the State's 1999 modeling study (based on actual data from the 1976-1977 period) to 9600 tons/year in the current modeling study. According to the State, the source had initiated or completed construction of two new furnaces prior to the baseline date to accommodate this increase, and therefore the State proposed a period *after* the 1976-1977 baseline period to determine emissions (1978-1979). The proposed furnaces did not affect actual emissions in the 1976-1977 period. For the reasons noted above, EPA believes that the 2400 ton/year estimate using actual 1976-1977 source data is more appropriate and consistent with the PSD regulations.

B. The State inappropriately looks at 1975-1980 window, and then selects the highest two year consecutive period in this time frame.

49. As discussed above, this approach is inconsistent with the overall regulatory requirement to determine actual emissions during the baseline period. In a number of instances the State has even gone beyond the 1975 to 1980 window in an apparent effort to justify higher baseline emissions. For example the Tioga gas plant had actual emissions data available for the years 1971, 1975, 1977, and 1979. The State opted to use 1971 and 1977 data to estimate actual emissions for the 1976-1977 period. This resulted in emissions more than double what the State used in their 1999 Calpuff modeling study. Also to characterize baseline oil and gas emissions the State is using 1988 data (see discussion below).

50. For Milton R Young Unit 1, the State proposes to use 1978 to 1979 data as representing normal source operation for Unit 1 because of a variation in heat input per unit operating

hour during the 1970s. There is no indication that heat input values during the 1976 to 1977 period were related to some catastrophic occurrence, thus data from 1976 - 1977 should be used to calculate baseline emissions for Unit 1.

51. For the Stanton facility, the State determined that 1976 - 1977 data was not representative of normal source operation and used 1978 to 1979 instead. The Department references a February 18, 1977 letter in which the company indicates difficulty in the ability to supply steam to the turbine at the capacity level for which it was designed. High sodium coal apparently caused fouling of the boiler, and the company subsequently built Unit 10 to supply additional steam. EPA does not consider this to be catastrophic occurrence, as the source is adjusting its operations to optimize efficient power production. Use of 1976 - 1977 data would better characterize emissions in the base year than the 1978 - 1979 data would.

52. For Leland Olds Unit 2, the State concluded that 1976 to 1977 data did not reflect normal operation because the unit was in startup mode in 1976 and had many forced outages. For this reason the State used the higher emissions period of 1977 to 1978 instead. EPA would need to see more documentation to determine whether the conditions in 1976 reflected a catastrophic occurrence. The State's modeling report references a May 26, 1976 letter from the company that may be useful. EPA requests a copy of this letter for review.

C. The State inappropriately takes into account <u>any production increases anticipated</u> at the time of the baseline date.

53. The State's approach includes any production increases <u>anticipated</u> at the time of the baseline date. The State appears to reference preamble language from EPA's 1980 PSD Preamble.[71] EPA believes the State is taking the language from the preamble out of context. Under EPA's 1978 policy, included in the baseline as actual emissions were any future increases in hours of operation or capacity utilization, if the source could have been reasonably expected to make the increase after the baseline date.[72] In 1980, EPA *reversed* this earlier approach and stated that

> Unlike the June 1978 policy, baseline concentration will no longer routinely include those emission increases after the baseline date from sources contributing to the baseline concentration, which are due to increased hours of operation or capacity utilization. Existing policy permitted this grandfathering, provided such

[71] "[I]nclude those emission increases after the baseline date from sources contributing to the baseline concentration, which are due to increased hours of operation or capacity utilization." 45 Fed. Reg. 52676, 52714 (Aug. 7, 1980).
[72] 43 Fed. Reg. 26380, 26400 (June 19, 1978).

increases were allowed under the SIP and reasonably anticipated to occur as of the baseline date. Today's policy which normally excludes such increase is consistent with using actual emissions to calculate baseline concentrations.[73]

54. As discussed in section VI., the State could use production increases if the facility suffered some kind of catastrophic event . The State has not made such a demonstration for the data used.

D. The State inappropriately takes into account any changes in fuels or raw materials anticipated at the time of the baseline date (e.g., sulfur content).

55. Same comment as in C., above.

E. The State inappropriately uses a weighted average of sulfur content over the life of the mine used at the time of the baseline date.

56. The State uses a weighted average of sulfur content over the life of each mine used by each of the sources at the time of baseline date. Again, this approach is not consistent with the requirement to determine actual emissions during the baseline period. The approach also seems to conflict with the State's proposed method to look at emissions within the 1975 to 1980 window. As shown in Table 2, mine average sulfur content levels are higher than the measured 1976 and 1977 values for Heskett, Leland Olds, Stanton and Milton R. Young power plants. Use of life-of-the-mine average coal sulfur values would increase base year emissions by approximately 11,000 tons. EPA believes that use of the actual 1976 and 1977 sulfur data should be used in determining base year emissions for these facilities.

57. Another aspect of the State's baseline inventory method is the use of AP-42 emission factors to determine power plant emissions unless specific sodium ash data (Na2O) are available. An alternative emission factor may be used if adequate sodium ash data are available. In the Baseline Emission Rate report the State references two letters that provide additional information on the sodium content for two facilities.[74] EPA requests a copy of these letters to determine whether the alternative factors are appropriate. It does not appear that the State has used the alternative emission factors in the April 2002 modeling study.

F. Oil and Gas Emissions Estimate

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[73] 45 Fed. Reg. 52676, 52714 (Aug. 7, 1980).

[74] North Dakota Department of Health, Draft Prevention of Significant Deterioration - Sulfur Dioxide - Baseline Emission Rates, at 23 (April, 2002) (*available at* http://www.health.state.nd.us/psd/).

58. EPA provided written comments to the State on April 3, 2002 in response to a protocol describing how the State was preparing baseline oil and gas emissions estimates.[75] It appears that the same inventory approach addressed in our previous comments was used in the State's April 2000 modeling study. One major concern with the protocol was that the estimates were based on the average of peak short term emission rates, rather than annual average emission rates. This is a problem in estimating emissions from oil and gas sources because the sources may only operate for a period of weeks or months at a time, but under the State's approach they would get increment expansion credit as if they were operating continuously for the entire year. With the very large number of such sources, we believe that it is unrealistic to assume that they would all operate at peak levels all the time. This concern was highlighted by the fact that a 1983 State study of oil and gas emissions for 1981 and 1982 showed much lower emissions than the current estimates.[76] Based on trends in SO_2 monitoring data and oil production data SO_2 emissions should have been even lower in 1976 - 1977.

59. In reviewing the discussion in the PSD Baseline Emission Rates document, the text indicates that the Williston Basin Study (WBS) was used to calculate oil and gas SO_2 emission rates from November 1987 to March 1988 and that these data were used directly to estimate 1976 to 1977 emissions.[77] The only major adjustments were that the WBS emissions were only applied to wells actually in operation in 1977, and in instances where 1987 - 1988 data were unavailable, field average values from the WBS were used. EPA is concerned that direct use of WBS 1987 to 1988 data will overestimate base year emissions and the amount of increment expansion credit. The concern can be seen by referring to the Billings County monthly oil production data in Figure 2, and the Statewide oil production data shown in Figure 6. In both cases the volume of oil produced in 1988 is nearly double that produced in 1976 - 1977. We recommend that the State develop a simple scaling factor based on oil and gas production totals that would account for the lower production levels that occurred in 1976 - 1977. Gas production should also be accounted for in developing the scaling factor. In the event that some of the gas production data are unreliable, we suggest that the State develop an area average correlation factor between total oil and gas production using the WBS data.

60. The issue of temporary emissions sources are also a concern. Some oil field sources, such

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[75] Letter from Richard R. Long, Director, Air and Radiation Program, EPA Region VIII, to Terry O'Clair, Director, Division of Air Quality, State of North Dakota Department of Health (April 3, 2002) (on file at EPA Region VIII, Denver, Colorado).

[76] North Dakota State Department of Health, Division of Environmental Waste Management and Research, Division of Environmental Engineering, Final Report - Sulfur Dioxide Emissions Inventory for Sources Near the Theodore Roosevelt National Park, Prepared for National Park Service (February 1983) (on file at EPA Region VIII, Denver, Colorado).

[77] *Id at 81.*

as flares may only operate for a total of three or four months. EPA believes the State has not demonstrated the legal authority to include temporary emissions of this nature as increment expansion sources.

VII. HOW ARE THE CLASS I SO_2 INCREMENTS APPLIED TO THE FORT PECK INDIAN RESERVATION? (Scope of Hearing #6)

61. The State is proposing to not apply Class I SO_2 increments to the Ft. Peck Indian Reservation in Montana because the State issued PSD and construction permits prior to EPA's approval of the Tribe's redesignation to Class I on February 8, 1984. We are reviewing the State's interpretation and will be consulting with the Tribe on this matter. Once those steps are completed we will provide our comments on the State's interpretation.

VIII. EPA DISAGREES WITH THE STATE'S SUGGESTION THAT ELKHORN RANCH MAY NOT BE PART OF THE THEODORE ROOSEVELT NATIONAL PARK

62. Congress established mandatory Federal Class I areas in section 162 of the Clean Air Act Amendments of 1977 (42 U.S.C. § 7472). Section 162(a)(4) of the Act designates as Class I all international parks, national wilderness areas which exceed 5,000 acres in size, national memorial parks which exceed 5,000 acres in size, and national parks which exceed six thousand acres in size and which were in existence on August 7, 1977. On April 25, 1947, President Truman signed Pub. L. No. 80-38, creating Theodore Roosevelt National Memorial Park.[78] This included the South Unit and Elkhorn Ranch. Elkhorn Ranch was designated in section 4 of the 1947 Public Law.[79] The North Unit was added to the Memorial Park in 1948. Therefore, when the Clean Air Act was amended in 1977, all three units of Theodore Roosevelt National Memorial Park were covered by section 162 (42 U.S.C. § 7472).

63. The State suggests in their document "Legal Issues Relating to PSD Baseline and Increment Consumption" that since one of the units of the park, Elkhorn Ranch, is "much smaller than 6,000 acres" it does "not necessarily meet the definition."[70] The State appears to provide this interpretation because they could not find anything that addresses

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[78] An Act Establishing Theodore Roosevelt Memorial Park of 1947, Pub. L. No. 80-38.

[79] "The Secretary of the Interior is further authorized to obtain by purchase or condemnation proceedings, as part of said Theodore Roosevelt National Memorial Park, lots 2, 3, 4, and 6 of section 33, township 144, range 102, and to reconstruct thereon the long ranch house thirty by sixty feet. . . ." Pub. L No. 80-38 § 4 (1947).

[70] Witham Draft Memorandum, *supra* 18, at 144.

whether Elkhorn Ranch is part of the National Park.[71] According to the State's own regulations, however, the Theodore National Park Class I area includes the Elkhorn Ranch Site.[72] Moreover, the State's comments note that when the first increment consuming sources were permitted in North Dakota, the Elkhorn Ranch was "inadvertently omitted" and not included in the required source impact analysis.[73] The State adds that "out of fairness" to the sources which had been granted authority to construct without undertaking the required modeling of Elkhorn Ranch, a provision was added to North Dakota's PSD program. This provision specifies that "[t]he class I increment limitations of the Theodore Roosevelt Elkhorn Ranch Site of the Theodore Roosevelt National Park shall apply to sources or modifications for which complete [PSD] applications were filed after July 1, 1982."[74] Thus, the State clearly considered Elkhorn Ranch to be a part of the Theodore Roosevelt National Park at the time it revised its PSD regulations. The State's suggestion now that Elkhorn Ranch is not a part of the Theodore Roosevelt National Park system is without basis. EPA believes that all three units of Theodore Roosevelt National Park comprise one mandatory Federal Class I area and that all three units should be included in the State's increment modeling analysis.

64. The State's final conclusion that sources "for which complete PSD applications were filed prior to July 1, 1982 should not be counted as consuming Class I increment at the Elkhorn ranch site,"[75] is also contradicted by its own PSD regulations. Although North Dakota revised its regulations in the early 1980s "out of fairness" to address possible PSD violations of sources that had constructed without undertaking the required modeling of Elkhorn Ranch, the same regulatory provision clarified that the impact of emissions from sources "for which permits under this chapter have been issued . . . will be counted against the increments after July 1, 1982." Thus, the regulations ensure that in analyzing increment consumption, emissions from sources which did not include Elkhorn Ranch in their required source impact analysis – but which did nonetheless receive a PSD permit from the State – will be counted against the increment after July 1, 1982 modeling analysis.[76]

IX. COMMENTS ON STATE'S MAY 6-8, 2002 PUBLIC HEARING

65. EPA personnel attended the public hearing held in Bismarck between May 6 and May 8,

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[71] *See id.*; *but see* 54 Fed. Reg. 41094 (Oct. 5, 1989)(approving a revision to North Dakota's implementation plan and identifying the Elkhorn Ranch Unit of the Theodore Roosevelt National Park as a Class I area where visibility is an important value).

[72] ND Admin. Code § 33-15-15-01(2)(c).

[73] *See id.*

[74] *Id.* (emphasis added), citing ND Admin. Code § 33-15-15-01(2)(f).

[75] *Id. at 145.*

[76] *See, e.g.*, 40 C.F.R. § 81.423.

2002. While at the time of this writing we have not been able to complete a thorough review of the extensive written and verbal testimony provided at the hearing, we are able to provide comments on some of the testimony regarding the EPA January 2002 modeling study.

A. Suggestion to Use Only One Year of Meteorological Data, Rather Than the Five Years Outlined in the Modeling Guidelines

66. Several of the participants at the hearing recommended that EPA should abandon use of the 1990 to 1994 meteorological data base used in both the EPA January 2002 study and the State's April 2002 modeling study in favor of 2000 data. This was supported by noting that there were 32 surface meteorological stations available in 2000 compared with only 25 in the 1990 to 1994 period. Further, prognostic meteorological modeling using the MM-5[77] model would allegedly provide more reliable results.

67. EPA does not agree that the use of 2000 meteorological data would necessarily provide more reliable results than earlier data. Use of a single year of meteorological data would not satisfy the requirement to use five consecutive years of data in regulatory modeling.[78] One year of data (i.e. 2000) is not sufficient to characterize worst case meteorological conditions. Furthermore, EPA believes that data from the 1990 to 1994 are more complete than 2000 data because after 1995 many of the surface stations used in our modeling were converted to automated reporting systems. In the automated systems, cloud information is not reported above 12,000 feet. Use of the more comprehensive 1990 to 1994 surface data may enhance model performance. There is no evidence that use of the MM-5 prognostic meteorological model will provide improved model performance over the five year time frame necessary for regulatory modeling. Given the relatively flat terrain in North Dakota and large number of surface, upper air and precipitation reporting stations in 1990 to 1994, Calmet's MM-5 characterization of the meteorological conditions appears adequate for regulatory purposes, and is superior to the data sets used in most regulatory Calpuff/Calmet applications. North Dakota's testing of the model performance showed that Calmet is performing adequately without the use of MM-5.

B. Technical Concerns Expressed Regarding Applicability of Calpuff and State's Evaluation Study of the Calpuff Model.

68. Several consultants also suggested that Calpuff over predicts concentrations at distances

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[77] A discussion of the MM-5 model is available at http://www.epa.gov/scram001/tt26.htm#calpuff.

[78] 40 C.F.R. pt. 51, Appendix W § 9.3.1.2

beyond 200 km and "according to EPA's own guidance" cannot be used for distances beyond 200 km. This would prevent application of the model to receptors more than 200 km from major emissions sources such as Ft. Peck.

69. In the proposed revisions to EPA's Modeling Guideline, EPA notes that based on a review of a number of case studies "the Calpuff dispersion model had performed in a reasonable manner, and had no apparent bias toward over or under prediction, so long as the transport distance was limited to less than 300 km."[79] At distances beyond 300 km EPA acknowledges that field studies suggest that Calpuff tends to over predict surface concentrations by a factor of three to four. These over predictions may be mitigated by the use of the puff splitting option in Calpuff which was deployed in EPA's January 2002 study. The IWAQM recommendations for modeling long range transport state that "[u]se of Calpuff for characterizing transport beyond 200 to 300 km should be done cautiously with an awareness of the likely problems involved."[80] EPA's January 2002 study did not model source receptor distances of greater than 300 km, and the puff splitting option was deployed to mitigate any possible over predictions. Based on this EPA believes that using Calpuff to model receptors at Ft. Peck and other receptors less than 300 km from the major emissions sources is appropriate.

70. Another commentor said that the State's limited Calpuff model evaluation study was flawed in that it did not consider background concentrations. A background concentration of 4 ug/m3 was suggested. The commentor included a 4 ug/m3 background level in reevaluating the State's April 2002 study and in testing the commentors own Calpuff modeling analysis. The effect of adding the additional background concentrations was to degrade the performance statistics of the State's April 2002 Calpuff evaluation study. EPA has reviewed the procedure the State used and does not believe that adding additional background concentrations would be appropriate. The State modeled all significant SO_2 emission sources within 250 km of the two monitoring sites used in the evaluation. This included major sources in Canada and oil and gas sources within 50 km of Theodore Roosevelt National Park. Since all contributing SO_2 emissions sources that could affect concentrations at the monitors were included in the modeling, EPA believes that any additional SO_2 from sources beyond 250 km would be negligible. If background concentrations from sources beyond 250 km are really as high as the 4 ug/m3 level suggested by the commentor, emissions from these sources should also be included in the increment consumption modeling as well, since 4 ug/m3 is 80 percent of the 24 hour PSD Class I increment, and some of these "background" sources in the United States may be increment consuming.

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[79] 65 Fed. Reg. 21506, 21521 (April 21, 2000).
[80] IWAQM Report, *supra* note 4, at 18 .

C. The State and EPA Agree Calpuff is the Appropriate Model to Use, Others Express Concerns

71. EPA and the State believe Calpuff is *the* model to use in this instance, a long range transport situation where the Class I areas that may be threatened are more than 50 kilometers from emissions sources. However, since several parties to the State's proceeding suggest otherwise, EPA provides the following comments. Appendix W does not provide a preferred model or a "guideline model" for use in modeling long range transport situations. However, Appendix W provides that models selected for use in long range transport situations should be determined in consultation with the EPA Regional Office and the appropriate Federal Land Manager.[81] Consistent with this provision, EPA and the FLMs formed a workgroup, the Interagency Workgroup on Air Quality Modeling (IWAQM), to provide detailed recommendations for modeling long range transport impacts. The IWAQM issued a report in 1998 that recommends Calpuff for long range transport modeling.[82] Therefore, EPA believes Calpuff is the appropriate model to be used to address the current North Dakota PSD Class I increment issue.

D. Concerns that Calpuff Model Has Been Inadequately Evaluated

72. At the State's hearing on this matter, one of the parties suggested Calpuff should be validated before it can be used by the State. EPA disagrees with this suggestion for the following reasons. Calpuff has been tested and evaluated nationally. The results of the studies are available to the public on EPA's internet website.[83] There is no legal requirement to test Calpuff in a particular application before it is used a regulatory context as long as the model is used in applications for which it has been designed (i.e., for distances of less than 300 kilometers). Over the past five years, Calpuff has been used in hundreds of permit applications and Environmental Impact Statement analyses. The State tested the performance of Calpuff using data from both the Dunn Center monitor and another monitoring site at the South Unit.[84] The test showed that the model was reliable based on EPA's model evaluation procedures.[85]

E. Concerns Regarding the Accuracy of CEMS Data

73. A commentor stated that continuous emissions monitoring system (CEMS) data from

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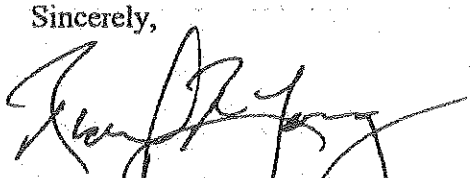
[81] 40 C.F.R. pt. 51 Appendix W § 7.2.6 (a). *See also,* 40 C.F.R. pt. 51 Appendix W §§ 3.2.2(a), 3.0.
[82] IWAQM Report, *supra* note 4, at 6.
[83] *See,* http://www.epa.gov/scram001/tt26.htm#calpuff.
[84] North Dakota Department of Health, Draft Report Evaluation of the Calpuff Model Performance Using Year 2000 Data (November, 2001).
[85] 40 C.F.R. pt. 51 Appendix W § 10.1.4.

EPA's acid rain data base are biased high, and are higher than emissions calculated based on AP-42 emission factors. Because in EPA's January 2002 modeling study CEMs data were used to determine current emissions, and AP-42 factors were used in the baseline years, the commentor felt that increment consuming emissions were overestimated in EPA's study. EPA responded to a similar point raised by the State in a February 27, 2002 letter to EPA.[86] In EPA's March 15, 2002 to the State we explained the reasons for our determination that EPA considers the CEMs data to be the best data available for use in increment analysis and we have seen no evidence from industry that would support the contention of a CEMs bias for the sources included in this analysis.[87] The perceived difference in the two methods may be related to problems in the AP-42 data rather than CEMs bias.[88] In accordance with the Acid Rain Program regulations, the quality assured CEMS data are certified by the company's Designated Representative, and in the absence of any approved source petition EPA considers these quality assured data to be accurate.[89]

Sincerely,



Richard R. Long, Director
Air and Radiation Program

[86] Letter from Terry L. O'Clair, Director, Division of Air Quality, North Dakota Department of Health, to Richard R. Long, Director, Air and Radiation Program, EPA Region VIII (February 27, 2002) (on file with EPA Region VIII, Denver, Colorado).

[87] Letter from Richard Long, Director, Air and Radiation Program EPA Region VIII, to Terry O'Clair, Director, Division of Air Quality, North Dakota Department of Health (March 15, 2002) (on file with EPA Region VIII, Denver, Colorado).

[88] United States Environmental Protection Agency, Office of Air Quality Planning and Standards, Compilation of Air Pollutant Emission Factors AP-42, Fifth Edition,, Volume I: Stationary, Point and Area Sources, Pub. No. AP-42 (*available at* http://www.epa.gov/ttn/chief/ap42/).

[89] 40 C.F.R. Part 75.

Glossary[90]

Air quality includes the ambient pollutant concentrations and their temporal and spatial distribution.

Air Quality Related Values (AQRV) are any resources in a Class 1 area needing protection from air pollution impacts.

Baseline concentration is the ambient concentration in the area existing at the time of the minor source baseline date (i.e. the date when the first complete PSD permit application affecting that area is submitted).

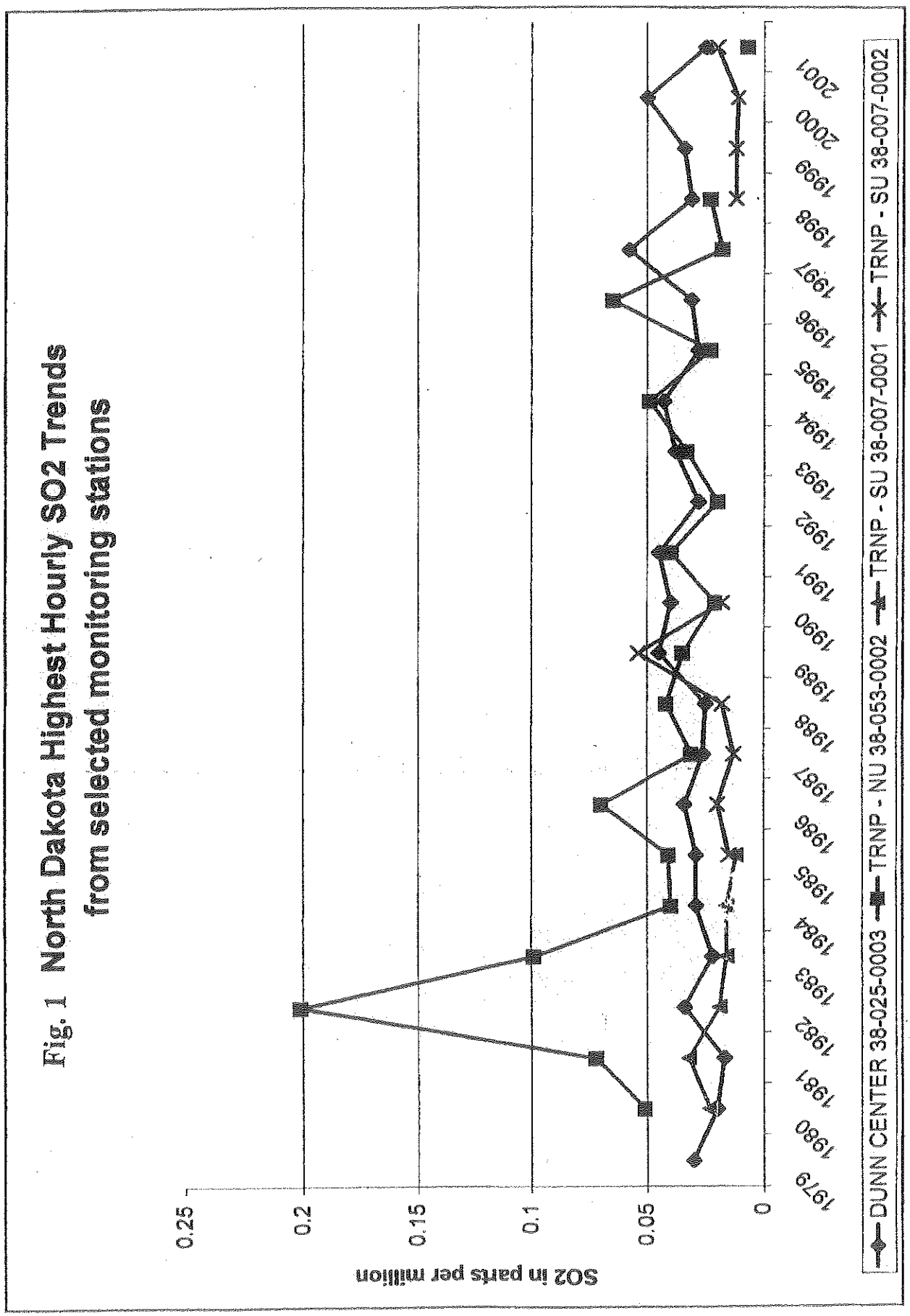
Increment consumption is the amount of increment used by sources since the baseline date, and it must be analyzed by new PSD sources and should be periodically tracked by States.

PSD increment is the maximum increase in ambient concentration that is allowable above a baseline concentration in a designated area. Exceedance of the increment is significant deterioration which the PSD program is supposed to prevent.

Significant deterioration is said to occur when the amount of new pollution exceeds the applicable PSD increment or Class I AQRV impacts occur.

[90] The Glossary is provided to assist readers unfamiliar with these terms.

Fig. 1 North Dakota Highest Hourly SO2 Trends
from selected monitoring stations



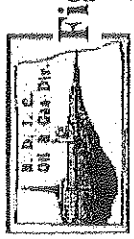


Fig. 2 MONTHLY PRODUCTION FOR LOCAL COUNTIES

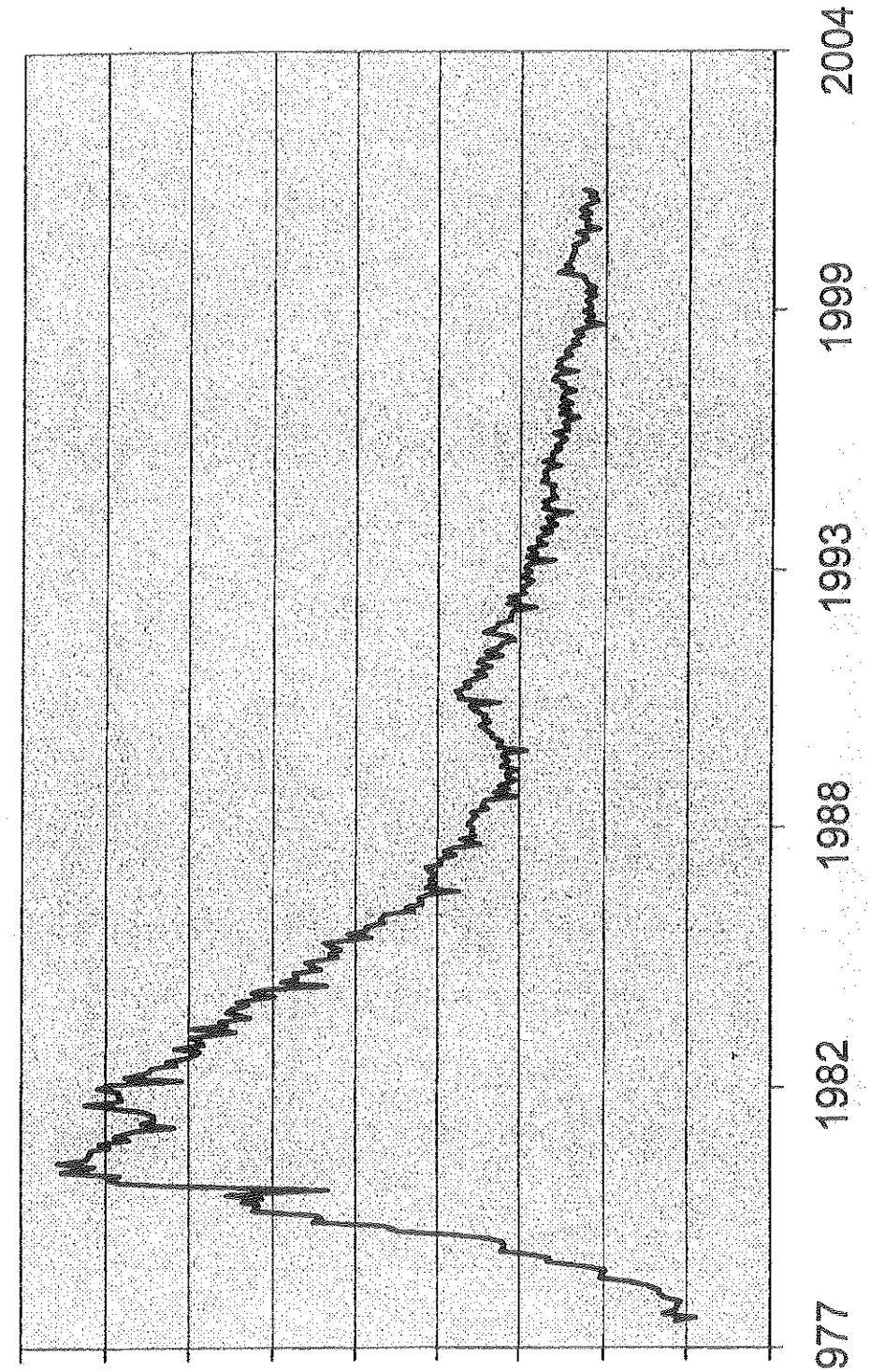
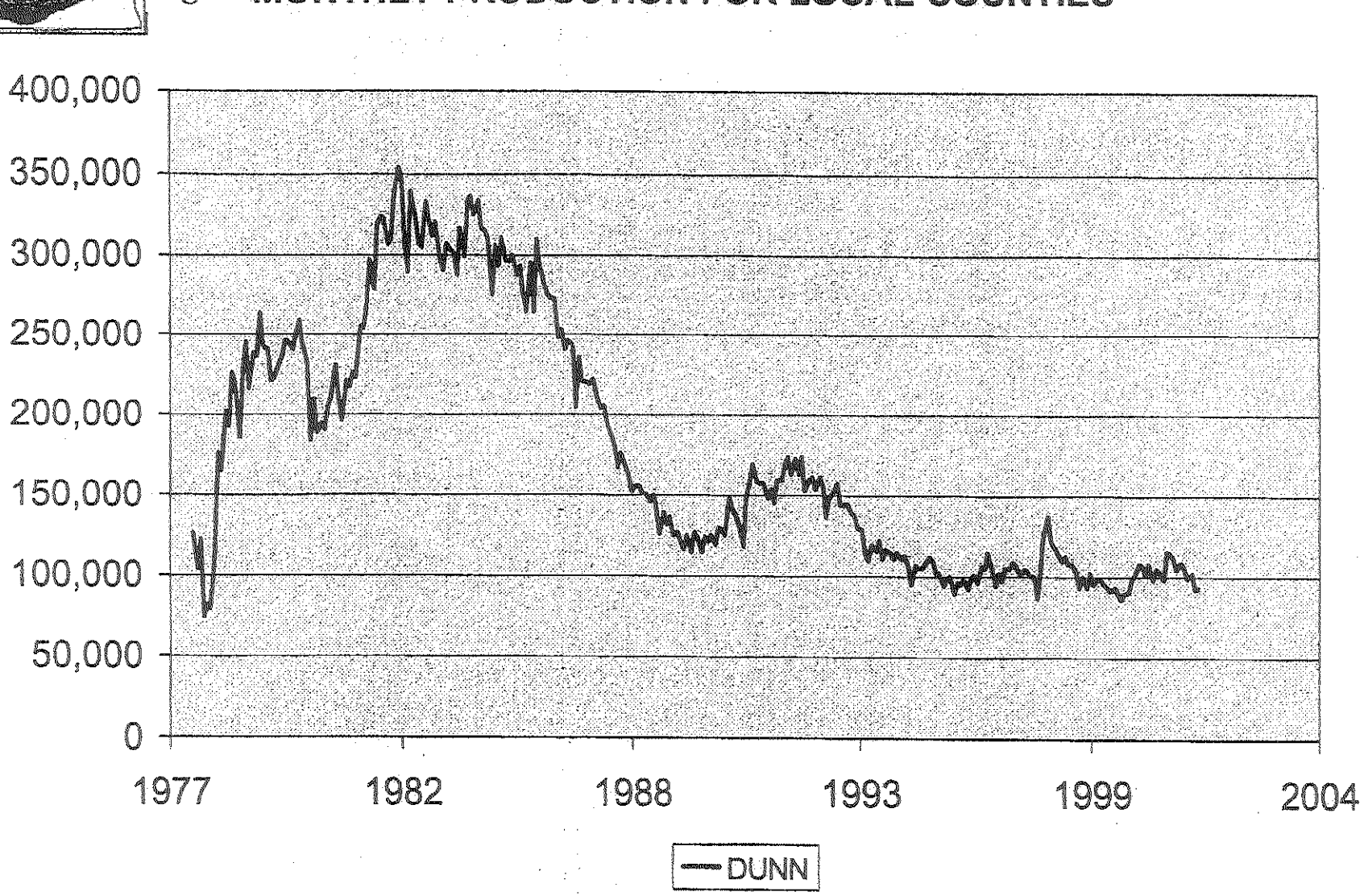


Fig. 3 MONTHLY PRODUCTION FOR LOCAL COUNTIES



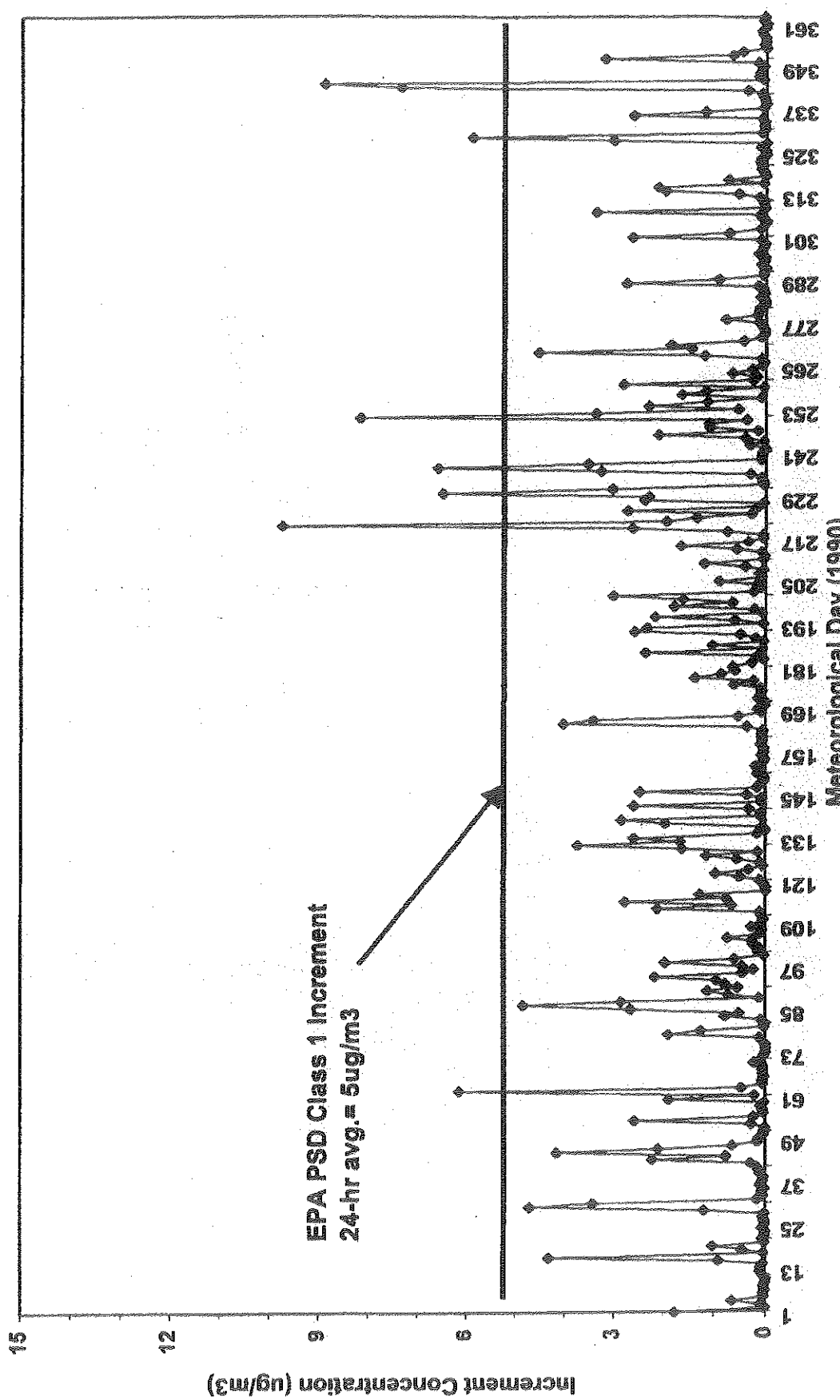


Fig. 4 Illustration of EPA's PSD Increment Methodology

Fig. 5 Illustration of EPA and ND Allowable Class 1 Increment (TRNP-SU)

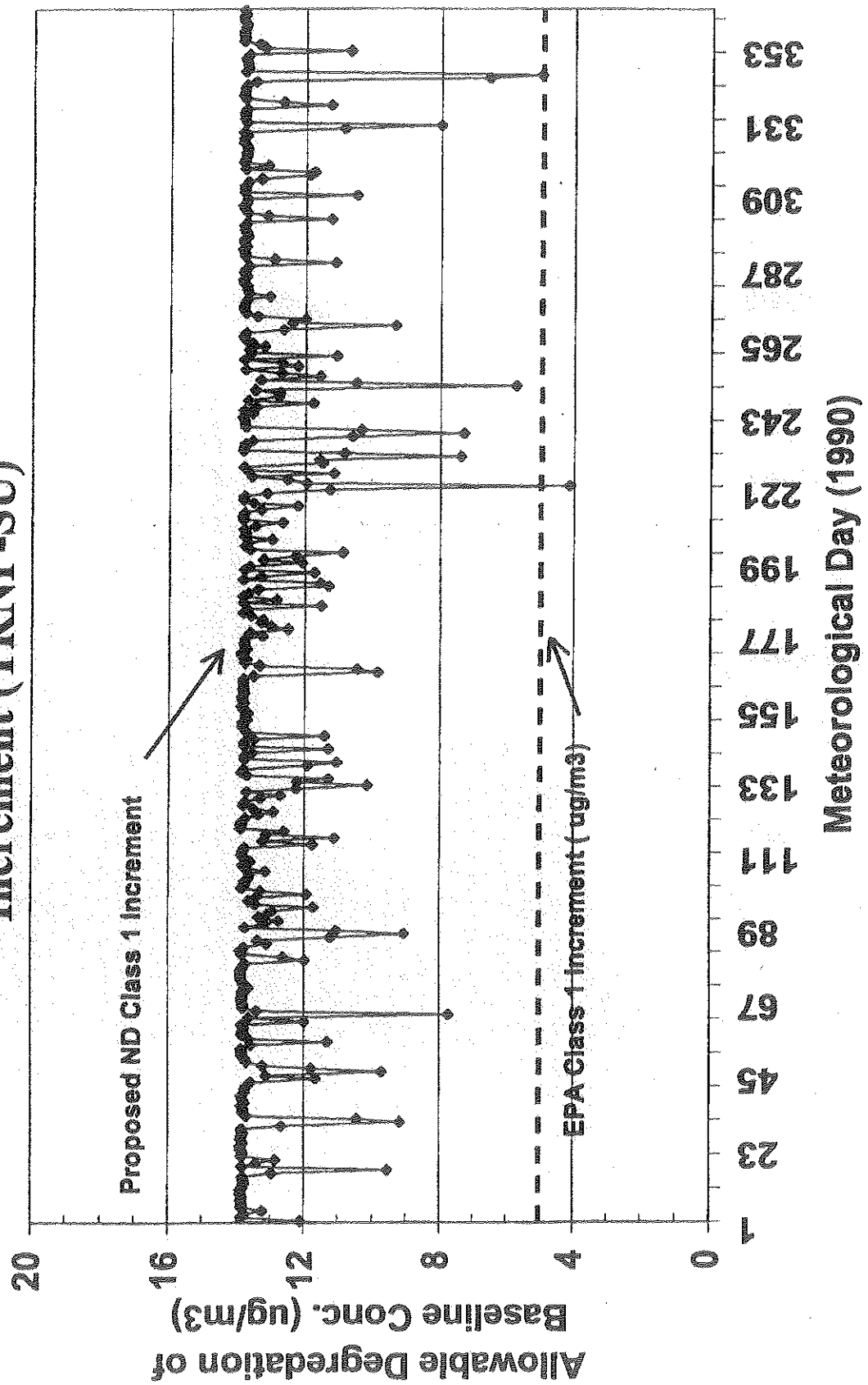


Fig. 6 North Dakota Annual Oil Production

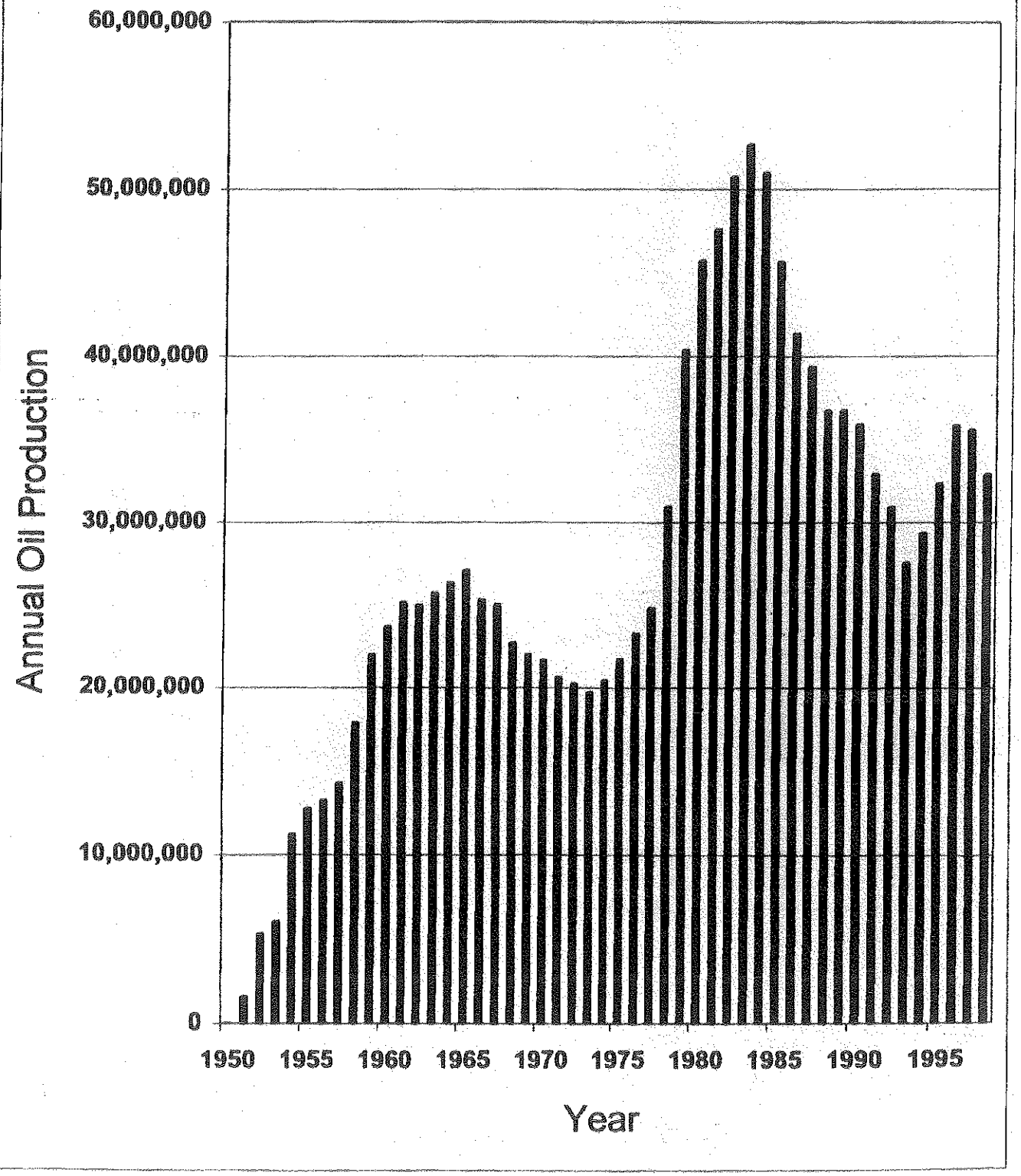


Table 1. Comparison of EPA and State of North Dakota PSD Modeling Methodology

	Overall Approach	Step 1	Step 2
EPA's PSD Modeling Procedure (January 2002): Temporally and Spatially Consistent	PSD increment calculations are based on changes in SO2 concentrations from a specific time (temporally) and location (spatially) in the base year.	Model net changes in emissions (between baseline and current year) sequentially for each 24-hour time period with at least 5-years of met data.	When the resulting maximum daily impacts from Step 1 are compared to the 5 $\mu g/m^3$ PSD increment there are eight exceedances of the 24-hour increment (see EPA Figure 4).

	Overall Approach	Step 1	Step 2	Step 3	Step 4	Step 5	Step 6
State of North Dakota's PSD Modeling Procedure (April 2002): Not Temporally Consistent	PSD increment calculations are spatially, but <u>not</u> temporally consistent.	Model baseline emissions concentration (1976-1977).	Determine the second-highest concentration at each receptor.	Add 5 $\mu g/m^3$ to the second-highest concentration at each receptor. Establish a "maximum allowable ambient level." [MAAL]	Model current year emissions with the same met data.	Compare the second-high prediction for the current year to the previously determined MAAL in Step 3.	Compliance with the increment is assumed if the second-high prediction in the current year is lower than the MAAL. There are no exceedances.

Table 2. Baseline Power Plant Annual Average Emissions Comparison

Source	ND Emissions (tons/yr)	Basis for ND Calculation	EPA Emissions (tons/yr)	Basis for EPA Calculation
Heskett Unit 1	1982	1976-1977 mine avg. S = 0.8%	1768	1976-1977 '76-'77 avg. S = 0.72%
Heskett Unit 2	4743	1976-1977 mine avg. S = 0.8%	4186	1976-1977 '76-'77 avg. S = 0.72%
Leland Olds Unit 1	12,494	1976-1977 mine avg. S = 0.65% (until 1993)	8551	1976-1977 '76-'77 avg. S = 0.45%
Leland Olds Unit 2	21,449	1977-1978 mine avg. S = 0.65% (until 1993)	13,094	1976-1977 '76-'77 avg. S = 0.45%
Stanton Unit 1	6754	1978-1979 mine avg. S = 0.69% (until 1992)	7176	1976-1977 '76-'77 avg S = 0.65%
MRY Unit 1	17,004	1978-1979 mine avg. S = 0.77%	13,383	1976-1977 '76-'77 avg. S = 0.58%
MRY Unit 2	19,175	1979-1980 mine avg. S = 0.80% 1.2 lb/mmBTU limit avg heat input	24,682	allowable limit
TOTAL	83,601		72,840	